

**THE EFFECT OF A SPORT- AND NUTRITIONAL PROGRAMME ON COMPONENTS
OF PSYCHOLOGICAL DEVELOPMENT IN PREVIOUSLY DISADVANTAGED
SCHOOL-AGED RUGBYPLAYERS**

**Marlize Heppell
B.A. Honours (Psychology)**

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Supervisor: Prof. E. van Rensburg
Assistant supervisor: Dr. H. Wright

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MARLIZE HEPPELL

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SUMMARY

THE EFFECT OF A SPORT- AND NUTRITIONAL PROGRAMME ON COMPONENTS OF PSYCHOLOGICAL DEVELOPMENT IN PREVIOUSLY DISADVANTAGED, SCHOOL-AGED RUGBYPLAYERS

KEYWORDS: Nutrition programme, psychological development, previously disadvantaged, primary school-aged boys, sport development programme

This study aimed to determine what the effect of a sport development and nutrition intervention programme would be on the following components of psychological development of previously disadvantaged, primary school-aged rugby players: self-esteem; cognitive development, attention and concentration and social support.

The participants were primary school boys between the ages of 9 and 14 years from disadvantaged communities. They were recruited on the basis of availability from six primary schools in the Potchefstroom area of the North West Province involved in a rugby development programme.

The research design was a randomised, single-blinded, controlled intervention study. The children were randomly assigned to either an experimental or a control group. The experimental group of children received an exercise intervention and a nutritional supplement twice a week for a period of three months. The control group received no sport or nutritional interventions during this period.

The research methodology included pre-testing, intra-testing and post-testing. With the pre-testing a comparison could be drawn between the experimental and control group regarding the above-mentioned psychological components. During the intra testing each of the 2 groups was evaluated separately regarding these components to identify any changes that could have taken place within the group from baseline to end. With the post-testing the 2 groups were compared with each other regarding these components to determine whether the nutrition and exercise interventions resulted in any markable

changes to especially the experimental group.

The results showed an statistically significant improvement in self-concept within the experimental group ($p = 0.028$) whereas no difference in self-concept within the control group was obtained. The effect of the intervention programme was not as clearly observable in any of the other psychological components. A longer duration of such an intervention programme could possibly contribute to better test results. The socio-economic circumstances of the participants played an important role in the final outcome of the study in that it influenced the social support the participants received and it also had an effect on the test behaviour of the participants.

OPSOMMING

DIE EFFEK VAN 'n VOEDING- EN SPORTONTWIKKELINGSPROGRAM OP KOMPONENTE VAN PSIGOLOGIESE ONTWIKKELING IN VOORHEEN- BENADEELDE SKOOLGAANDE RUGBYSPELERS

SLEUTELWOORDE: Voedingaanvullingsprogram, sportontwikkelingsprogram, psigologiese ontwikkeling, voorheen-benadeelde, laerskoolseuns

Daar is met die studie gepoog om die effek te bepaal van 'n voedingintervensie- en sportontwikkelingsprogram op sekere psigologiese komponente by voorheen benadeelde skoolgaande rugbyspelers. Hierdie komponente behels die volgende: selfbeeld; kognitiewe ontwikkeling, aandag en konsentrasie en sosiale ondersteuning.

Die deelnemers aan die program was laerskoolseuns tussen die ouderdomme van 9 en 14 jaar uit voorheen benadeelde gemeenskappe. Hulle is gewarf, op grond van beskikbaarheid, by 6 verskillende laerskole in Potchefstroom wat by 'n rugby ontwikkelingsprogram betrokke is.

Die navorsingsontwerp was 'n ewekansige en enkelblind gekontroleerde steekproef in die vorm van 'n intervensiestudie. Die eksperimentele groep het 'n voeding- en oefeningintervensie 2 keer per week vir 'n tydperk van 3 maande ontvang. Die kontrole groep het gedurende hierdie tydperk geen voeding- of oefeningintervensie ontvang nie.

Die navorsingsmetodologie het voortoetsing, intra-toetsing en na-toetsing behels. Tydens die voortoetsing is die eksperimentele en kontrole groepe in terme van die genoemde psigologiese komponente geëvalueer. Tydens die intra-toetsing is beide groepe afsonderlik geëvalueer om enige veranderinge in genoemde psigologiese komponente wat vanaf die aanvang van die program tot met die einde voorgekom het, te identifiseer. Met die na-toetsing is die 2 groepe weer op grond van hierdie komponente met mekaar vergelyk om die moontlike effek van die voeding- en oefeningsintervensies te bepaal.

Die uitslae van die toetse het wel statisties beduidende veranderings in terme van selfkonsep teweeg gebring by die eksperimentele groep ($p = 0.028$). Die effek van die intervensies was nie so duidelik by die ander komponente nie. 'n Langer duur van die program kon moontlik tot 'n groter effek by die ander komponente gelei het. Die sosio-ekonomiese status van die deelnemers het ook 'n belangrike invloed op die toetsuitslae gehad deurdat dit bepalend is vir die sosiale ondersteuning wat die deelnemers op kan staatmaak en toetsgedrag is ook daardeur beïnvloed.

CONSENT:

We hereby give consent that Marlize Heppell may submit the manuscript for the purpose of a mini-dissertation.

It may also be submitted to the Psychology of Sport and Exercise for publication.

Professor E. van Rensburg

Doctor H.H. Wright

INTENDED JOURNAL AND GUIDELINES FOR AUTHORS

Psychology of Sport and Exercise

Notes for Contributors

Abstracts: Papers should include a structured abstract, not exceeding 250 words, covering the main factual points and statements of problem, method, results and conclusions.

Abbreviations: Avoid abbreviations except for long, familiar terms. Explain what an abbreviation means the first time it occurs. When an abbreviation is commonly used as a word, it does not require explanation (IQ).

Text: The guidelines set forth in the *Publication Manual of the American Psychological Association (5th Edition)* were followed. Figures and/or tables must not be included in the text.

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Paper Length: While no maximum length of contributions is prescribed, authors are encouraged to write concisely.

Tables: Tables should be numbered consecutively and given a suitable caption and each table printed on a separate sheet. No vertical rules should be used. Tables should not duplicate results presented elsewhere in the manuscript.

MANUSCRIPT TITLE, AUTHORS AND ADDRESSES

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B. M. Heppell

School for Psycho-Social Behavioral Sciences
North-West University
Private Bag X 6001
Potchefstroom
2520
South Africa

Professor E. van Rensburg
School for Psycho-Social Behavioral Sciences
North-West University
Private Bag X 6001
Potchefstroom
2520
South Africa

Tel: 018 – 2991727

Fax: 018 - 2991730

E-mail: psgevr@puknet.puk.ac.za

Doctor H.H. Wright
School of Physiology, Nutrition and Consumer Sciences
North-West University
Private Bag
Potchefstroom
2520

Tel: 018 – 2992466

Fax: 018 - 299 2464

E-mail: vgehw@puk.ac.za

C. Statistical Consultant: Dr. S. Ellis
Statistics Department
North West University

D. Word Count: 13730

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Marlize Heppell : B.A. Honours (Psychology)

Esmé van Rensburg*: Ph.D. (Psychology)

Hattie Wright: Ph.D. (Nutrition)

Marlize Heppell is a Master's student in Psychology at the North-West University. Professor Esmé van Rensburg is an associate professor and Psychologist at the North-West University. Dr. Hattie Wright is a senior lecturer at the School of Physiology, Nutrition and Consumer Sciences at the North-West University. Correspondence can be forwarded to the School of Psycho-Social Behavioral Sciences, North-West University, Private Bag X 6001, Potchefstroom, 2520, South Africa, Tel: 018 2991727.

* To whom correspondence should be addressed.

**THE EFFECT OF A SPORT- AND NUTRITIONAL PROGRAMME ON COMPONENTS OF
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ABSTRACT

Objectives: The study aimed to determine what the effect of a sport development and nutrition intervention programme would be on the following components of psychological development of previously disadvantaged, primary school-aged rugby players: self-esteem; cognitive development, attention and concentration skills and social support.

Methods: The research design was a randomised, single-blinded, controlled intervention study. The children were randomly assigned to either an experimental or a control group. The experimental group of children received an exercise intervention and a nutritional supplement twice a week for a period of three months.

Results: The experimental group showed an improvement regarding self-esteem at the end of the programme (the results were only statistically significant: $p = 0.028$). A high percentage of participants experienced problems with attention and coping skills.

Conclusions: Self-esteem was the first component to be influenced by the intervention programme. The disadvantaged background of the children influenced their behaviour on a broad spectrum. Practical problems were experienced, like educational language versus first language and the ability to handle the test material. The duration of the programme could have influenced the results (12 weeks seem to be too short).

INTRODUCTION

Primary school-aged boys from previously disadvantaged communities rarely have the opportunity to participate in structured physical activity and competitive sport (Berg, 1973). Nutritional intakes of these children are also often suboptimal and indicative of malnutrition, which could have a negative effect on physiological and psychological development (Klugman, 2002). The National Food Consumption Survey reported that for South African children as a whole, the average dietary intake was less than 67% of the Recommended Dietary Allowances (RDA), and in many cases below 50% of the Recommended Dietary Allowances (as cited in Klugman, 2002). Depending on the nutrient and the severity of deficiency, the consequences of malnutrition may include impaired physiological development and certain diverse psychological components, for example social, affective and cognitive processes as well as behaviour. The aim of this intervention study is to improve these components of Black primary school boys' psychological functioning.

The physical health benefits of regular physical activity are well-established (World Health Organization – Committee on Physical Activity For Health, 1995). Regular physical activity promotes a longer and better quality of life, reduced risk of a variety of diseases and has many psychological and emotional benefits (Biddle, Fox & Boutcher, 2000; Biddle & Mutrie, 2001; Sallis & Owen, 1999).

Regular physical activity contributes to the acquisition of fundamental motor proficiency which is an important goal for early childhood (Freedson & Bunker, 1997). Children must learn to control their bodies in space and they need to acquire the fundamental skills which will help with recreational or leisure activities (Freedson & Bunker, 1997). Activities in childhood must include both the motor and health aspects of physical fitness, because children need a reasonable level of motor skill development to take part in exercise and sport activities which will provide them with endurance, power and strength. Children also need reasonable levels of fitness to engage in exercise and sport activities which will provide them with physical activity as adults (Freedson & Bunker, 1997).

For children to take part in regular physical activities their nutritional intake needs to be on satisfactory levels. It is indicated that children with protein energy malnutrition and micronutrient deficiencies have a lower physical activity level than well nourished children (Pollit, 2000). It was shown in a review (Pollit, 2000) that undernourished children try to maintain energy balance by either decreasing the frequency and duration of high-energy activities, or decreasing the intensity of motor actions. This can contribute to unbalanced

anthropometric proportions, weakened muscle strength and maturation causing limited acquisition of motor skills, and finally decrease their drive for exploration (Pollit, 2000).

Undernourished children tend to develop immature emotional states and insecure attachment styles and this contribute to a decrease in physical and social environment exploration (Graves ,1978; Pollit, 2000; Thompson, 1994). Protein energy malnutrition and certain micronutrient deficiencies such as iron, zinc, cobalamin, and vitamin B6 have been identified as developmental risk factors for cognitive development (Guilarte, 1993; Kopp, 1994; Louwman et al., 2000).

Exercise can have both a positive and a negative effect on psychological health, according to McAuley (1994). Positive correlations can be identified between exercise and self-esteem, self-efficacy, psychological well-being and cognitive functioning, and negative correlations between exercise and anxiety, stress and depression. Scully et al. (1998) concluded that attention has turned towards the specific effects of exercise on particular psychological functions and conditions and that the literature remains inconclusive as to the relation between exercise regimens and overall psychological well-being. In a literature analysis, Ruoff (1995), investigated the connection between sport or exercise and well-being. The type of exercise in this studies involved water and flexibility sessions with additional swimming, walking or aerobic dancing. One study asked about the frequency of sports team participation and the other dealt with non-team physical exercise. Another study assigned their participants to either an exercise programme or a control condition designed to simulate physical training. Sports involvement was also measured on several dimensions including behavioural, affective and cognitive interest in sports. One study compared female athletes to nonathletes on both well-being and body image. Four of the seven exercise studies that were examined pointed to a relationship between exercise and well-being. Callaghan (2004) underlines this opinion and provides detailed evidence-based information on the effects of exercise on mental health and well-being, the use of different exercise regimens to fit clients' needs and abilities, as well as addressing ethical issues relevant to exercise.

Some particular psychological functions that are influenced by regular exercise, include social, affective and cognitive functioning. Numerous studies have demonstrated that well structured and presented physical activity programmes can contribute to development of prosocial behaviours (Svoboda, 1994). Academic performance can also be enhanced by physical activity. Bailey (2004) refers to existing studies which suggest a positive relationship between intellectual functioning and regular physical activity, both for adults and children. The role physical activity plays in cognition and the relationships between activity

and mental development seems to be based on developmentally meaningful actions tied to critical gross motor actions (Pollit, 2000). The International Society of Sport Psychology (1992, p. 179) stated the following: "studies have shown that the process of exercise brings about both short- and long-term psychological enhancement and mental well-being. Aerobic activity can reduce anxiety, depression, tension and stress and it can increase vigour and promote clear thinking".

From the above it is therefore clear that physical activity plays an important role in the physiological, sociological and psychological development of children. It is also clear that semi-urban children, especially those from a poor socio-economic environment and previously disadvantaged communities, have an increased risk for suboptimal physiological, sociological and psychological development due to low physical activity levels and also possible undernutrition. These facts were the motivation for this study in which the impact of appropriate interventions to address the problem will be evaluated.

The aim of the study is to assess the impact of a sport development and nutrition intervention programme on the following psychological components, cognitive development, attention and concentration, self-concept and social support in previously disadvantaged school-aged rugby players.

Literature Study

The relationship between exercise and self-esteem

The several slightly different yet related constructs, such as self-esteem, self-concept, self-confidence, perceptions of competence and self-efficacy essentially refer, according to Weiss (1993, p. 41): " ...to the description of, evaluation of and affect toward one's competencies". Fox (2000b, p. 89) describes self-esteem as: "...a self-rating of how well the self is doing". The criteria on which self-esteem is based are, according to Fox (2000b), ultimately set by the individual. He describes self-esteem as essentially phenomenological and that the effect of exercise on self-esteem cannot be explained in the absence of consideration of the past experiences and values of the individual.

Self-esteem is regarded by Sonstroem (1997) as an important indicator of emotional stability and adjustment to life demands. It is closely allied to subjective well-being and happiness (Diener, 1984). It is through our bodies that we explore, learn, present ourselves and express our sexuality (Fox, 1998). Our physical selves provide the basis of our self-esteem

and many of our behaviour patterns.

Physical self-worth can, according to Fox (2000a), be promoted by exercise. Exercise influences physical self-concept so that people can develop a higher degree of physical acceptance. This should then lead to a better global self-esteem. Boyd and Hrycaiko (1997), Koniak-Griffin (1994), McAuley et al. (1997), Palmer (1995) as well as Pronk et al (1995), endorse this perception and say that it is fairly consistent across different age ranges and length of exercise programmes as well as intensity of exercise. Positive changes can be experienced by both men and women, according to Fox (2000a).

Improvement of self-esteem is not an automatic outcome of exercise programmes though. In some situations there is improvement in self-esteem and in others there is no change. Positive changes can be experienced by all age groups but there is greater evidence of change in children and middle aged adults. As reviewed by the Centers of Disease Control and Prevention (CDCP, 1997), regular physical activity increases levels of self-esteem and self-concept while decreasing levels of anxiety and stress in children and adolescents. Fox (2000b) also refers to the importance of the physical self to exercise and mental health. Various comprehensive instruments have been developed to assess self-ratings of the physical domain (Fox, 2000b). The Physical Self-Perception Profile of Fox and Corbin measures perceptions of sport competence, physical strength, physical condition, body attractiveness and overall self-worth and the Physical Self-Description Questionnaire of Marsh, Richards, Johnson, Roche and Tremayne (1994) measures nine elements of the physical self (general physical self and general self-esteem) and there are also instruments to measure singular aspects of the physical self, such as body image, body satisfaction, body acceptance and social physique anxiety. Children's self-esteems are an important part of their psychosocial development and is reflected in their behaviour and ability to adjust to demands of their environment (Haynes, 1990).

Studies have reported significant correlations between self-concept and achievement (Dean, 1977; Purkey & Smith, 1982). A meta analysis of 27 studies was conducted by Gruber (1986) on the positive effect of physical activity on self-esteem development in children. An overall effect size for physical activity on self-esteem of 0,41 (statistically significant) was found, meaning that children experiencing a physical activity intervention displayed self-esteem scores nearly one half of a standard deviation (0,41) higher than equivalent children in control groups.

Weiss, McAuley, Ebbeck and Wiese (1990) refer to the findings of a study with boys and girls (8 – 13 years) who attended an educational summer sports programme which showed that the children with higher self-esteem made attributions for their physical competence that were more internal, stable and personally controllable than did the children with low self-esteem. This underlines the importance of enhancing self-perceptions as a means of encouraging motivation for physical activity participation (Horn, 1987).

The following components were highlighted by Fox (1988) as important to enhance self-esteem in children through physical activity:

- An environment that encourages a sense of fitness competence ought to be provided by educators. The process of achieving fitness is more important than the product of fitness. The focus must be on self-improvement and mastery of goals rather than individual comparison or ego-orientated goals.
- An understanding of the importance of activity for health rather than for skill or performance.
- The greatest effects of physical activity are often found in children with initially low self-concepts and self-esteem improves with participation in physical activity regardless of physical activity type (Sonstroem, 1984).

High self-esteem individuals are more likely to participate in exercise programmes according to various researchers (Albinson, 1974; Tucker, 1983; Young, 1985). Frank and Gustafson (2001) argue that the relation between self-esteem and exercise has been fairly established although uncertainties exist regarding the methods to induce individuals low in self-esteem to voluntarily engage in exercise. A tendency among individuals with high self-esteem to engage more easily in sport participation or exercise programmes can be understood through Bandura's concept of reciprocal determinism. This theory indicates that behaviour, personality and environment interact together to determine personality and behaviour. The personality trait of positive self-regard leads to the adaptation of exercise behaviour and this, in turn leads to greater positive self-regard. The impact on one another is a reciprocal process (Bandura, 1977).

An increased self-esteem and exercise behaviour can exercise an impact on environmental conditions, according to Frank and Gustafson (2001). Via exercise the individual comes into contact with others who are more interested in fitness and that may encourage the continuation of these behaviours. Koniak-Griffin (1994) and Palmer (1995) speculated that the social contact may be a mechanism of change for self-esteem. It is not certain in the research whether the improvements in self-esteem are directly related to engaging in

physical activity versus engaging in any positive goal-orientated activity. According to Frank and Gustafson (2001) the research did not directly compare exercise to other goal-orientated behaviour and that a third variable such as social influence may also be involved.

Self-perceptions are strongly linked to motivated behaviour in physical activity settings. Wiese-Bjornstal (1997, p. 23) states it as follows: "It appears to be a cyclic relationship, in that better perceptions of oneself and one's abilities lead to enhanced effort, persistence and achievement, which in turn further benefit self-perceptions. The role of significant others is critical in positively affecting this cycle". Parents, coaches and peers should therefore be realistic, supportive and encouraging in reinforcing children's capabilities in physical activity.

Various types of exercise are effective in changing self-perceptions but there is ample evidence to support aerobic exercise and weight-training, with weight-training indicating the best results in the short term. Positive changes can be experienced by both men and women (Fox, 2000a). High self-esteem is linked to various positive characteristics such as independence, leadership, resilience to stress and adaptability (Wylie, 1989). High self-esteem is also associated with choice, persistence and success in a broad range of achievement and health-related behaviours.

According to Baumeister (1993), low self-esteem is often accompanied by mental illnesses and disorders such as depression, anxieties and phobias and as a consequence has been targeted for many years through therapy (Rogers, 1951). Participation in physical activity has also been linked to a lower incidence of depression and people who see their bodies as useful and powerful are less likely to abuse their bodies. This is of importance since a number of contemporary disorders such as anorexia, bulimia and chemical abuse begin in adolescence (Chernin, 1981). Frank and Gustafson (2001) state that if self-esteem can be enhanced, the psychological consequences of disorders can be reduced. D'Silva (2002) refers to the recommendations of Cynthia Levin, a Chicago based psychologist, who recommends that a client suffering from low self-esteem originating from childhood abuse, take up running to improve his/her competence and sense of control.

Evidence from intervention studies shows, according to Fox (2000b), that exercise helps people feel better about themselves and that it contributes to people's mental well-being and quality of life. Self-esteem and physical self-perceptions are linked to motivation through choice and persistence in health behaviors (including exercise). Jaffee and Manzer (1992) concluded that successful sport experiences can build confidence, self-esteem and positive body image.

The effect of exercise on cognitive performance

Cognition can be viewed as functions of the brain that include memory, association, abstract reasoning and spatial ability (Spirduso, 1983). According to Singer (1980) cognition consists of higher mental processes such as concept formation, problem solving, imagination, perception, decision making and intelligence. Interaction between these processes occur and allow humans to process information and make decisions.

Increases in cerebral blood flow in the prefrontal somatic-sensory and primary motor cortices of the brain have been documented after physical activity and it assists in cognitive functioning, enhancing mood, increasing mental alertness and improving self-esteem (Biddle and Mutrie, 2001; Hills, 1998). Research by Mutrie and Knill-Jones (1986) including subjective reports from runners, suggested that over half of those questioned perceived that after running they could think more clearly.

The readiness to learn activities can be interpreted in two ways, namely attitudinally and developmentally (Singer, 1980). Seen from the attitudinal point of view, learning is more productive when the child is mentally and emotionally set for the experience. The teacher or coach plays an important role. Instructional and communication styles can do much to shape the attitudinal process. Regarding the developmental point of view, activities cannot be learned unless the child is at the appropriate stage of development. Teachers and coaches should try to understand the developmental level of the child and to modify experiences and activities so that they can be meaningfully engaged. Singer (1980) emphasised the fact that children need to be challenged and yet have the feeling of success. This can best be attained when activities are suitably presented to children with consideration of their developmental stage.

Systematic motor exploration is the basis for all learning since motor activity is information gathering (Ismail, Kephart and Cowell, 1963). They conclude that children need generalised motor experiences, they need to explore in order to have the background necessary for later success in school work. The motor generalisations are referred to as balance and posture, propulsion and receipt, locomotion, contact and manipulation.

A child must go through all the development levels during childhood to achieve his or her full intellectual potential. Ismail, et al. (1963) call for more emphasis on the developmental aspects of sport and less on the competitive and social aspects. The importance of a

minimum ability in a wide range of activities is emphasized. Varied motor experiences are more effective in contributing to the cognitive processes than overconcentration on a singled out skill.

A meta-analysis of 18 previously published studies that examined the effects of exercise on cognitive functioning in elderly people had been conducted by Van Sickle, Hersen, Simco, Melton and Van Hasselt (1996). The results show that exercise produced a moderate improvement in cognitive functioning. The cognitive benefits attributed to exercise according to this meta-analysis, are especially relevant in people whose cognitive function is below optimal levels. Milligan, Powell, Harley and Furchtgott (1984) refer to another factor that influences ageing and cognitive performance, namely health status or secondary ageing. The incidence of disease increases as people age and disease has been linked to cognitive decline. They state that people who exercise generally possess less disease (e.g., cardiovascular disease, adult onset diabetes) and that fitness can contribute positively towards cognitive performance by keeping people healthy. The effect of fitness on primary as well as secondary ageing include important issues for this research area. Boutcher (2000) concluded that a number of direct and indirect mechanisms could underpin the relationship between fitness and the cognitive functioning of older adults. He referred to cerebral blood-flow, increased neurotrophic stimulation, increased neural efficiency, improved health, and greater motivation.

Conflicting evidence exists in literature on the effects of exercise on cognitive processing (Tomprowski & Ellis, 1986). As an explanation they refer to the experimental designs as well as different fitness levels, relative rather than absolute work loads and the differing intensities and duration of exercise that can influence results. Despite the quantifiable denominators within the assessment parameters, the data will need subjective interpretation, weighing of components and judgments from the researchers to make a final conclusion whether the programme has had effects on the various levels of analysis. Biddle and Mutrie (2001) state that the following two aspects can be addressed: firstly, the effect on cognition during exercise and secondly, the post-exercise effect. The tests used to measure the cognitive functioning must also be free from influences of prior experience and learning.

Hervet (1952) refers to the classic study of the relationship between physical activity and school performance that was carried out in France in the early 1950's. Academic curriculum time was reduced by the researchers by 26% , replacing it with physical activities. Academic results did not worsen, though, and there were fewer problems with discipline, greater attentiveness and less absenteeism. Sallis et al. (1999) mention more recent studies which

found improvements for many children in academic performance when time for sport and physical activity was increased in their school day. The conclusion of three large-scale studies found that academic performance was maintained or even enhanced by an increase in a student's levels of physical activity, even if the academic time was reduced (Shephard, 1997).

It can be concluded that the available research evidence suggests that increased levels of physical activity in school does not interfere with pupils' academic achievement, and is in many instances associated with improved academic performance. Existing studies do, according to Bailey (2004) suggest a positive relationship between intellectual functioning and regular physical activity, both for adults and children.

The effect of exercise on attention and concentration skills

Singer (1980, p. 410) states that: "Attentiveness refers to the readiness of a person to receive certain information and process it, and this state may fluctuate at any time. When arousal is high, a person's attentiveness may be poor because of momentary changes in situational information. Concentration, according to Singer (1980), would refer to the extent of a person's attention. This can be on a wide or narrow range of inputs. James (1890) also includes focalisation, concentration or consciousness as components of attention. In **The Principles of Psychology**, James (1890) described attention as the process when several simultaneously possible objects or thoughts take possession of the mind in a clear and vivid form.

The difference between successful and unsuccessful performers often lies in the ability of a person to exhibit prolonged concentration in activities of some duration (Singer, 1980; Murphy & Tammien, 1998). Highly skilled persons can reach this state without conscious effort. Guidance and experiences lead to the preferred state of concentration. Attention must be flexible and adaptable and therefore it is associated with the term **selective attention**. This means that the human behaving system is maintaining a selective process, focusing only on a restricted number of cues at a time. High level problem solving skills are needed to prioritise needs and to allocate appropriate attention to each. Gill (2000) as well as Abernethy and Russell (1987) stated that concentration implied control of attention. A high-functioning athlete has to be able to shift attention when necessary and to maintain concentration despite distractions and to recognise relevant cues and distinguish them from irrelevant ones.

According to Csikszentmihalyi (1990) intense levels of concentration are produced when an athlete's skill level is matched with the challenge he or she faces. Sport-specific measures may thus be very important in the assessment of concentration and attention skills. An athlete's concentration skills may be good in one sport and poor in another. Variations in concentration are probable for an athlete between different tasks within the same sport as well. The attention-performance literature can be categorised into three perspectives: information processing, social psychological, and psycho-physiological. According to Easterbrook's model (Gill, 2000) increases in emotional arousal result in narrowing of the attention field. As arousal increases, some attention narrowing improves performance, but further increases and narrowing impair performance as important cues are lost. Gill (2000) refers to the psycho-physiological perspective and the role of brain activity and electroencephalogram measures. A few sport and exercise psychologists have continued to investigate psycho-physiological perspectives while others have crossed into motor behaviour with information-processing perspectives (social psychological perspective). According to Gill (2000) the processing process can be controlled or automatic. Controlled processing is slow and effortful while automatic processing is fast and effortless and not under conscious control. Attention capacity refers to limits in the amount of information that a person can process at a time. Control processing is vulnerable to structural and central limits on attention capacity whilst automatic processing is not limited by attention capacity.

In the context of this study the goal is to conclude whether any changes in cognitive abilities, attention and concentration skills have occurred after an exercise and nutritional intervention programme.

The relationship between exercise and social support

Sports can, according to Coakley (1987), be divided to describe informal as well as organised sports and **socialisation** refers to the process of social interaction through which people develop, extend, and change their ideas about who they are and how they relate to the world around them. The process of socialisation is a never-ending process.

Social support has been defined by researchers as the number of friends, relatives, or social involvements one has and conceptually social support refers to acceptance or belongingness. The study of Johnston and Carroll (2000) emphasised the importance of social support. Their study showed that those groups of participants who were more involved in sport and exercise before being injured were more likely to adopt a guidance-and support-seeking coping strategy. Gill (2000) sees social support as multidimensional with

greater emphasis on quality of support than quantity of social contacts. Shumaker and Brownell's (1984, p.13) see social support as the following: "...an exchange of resources between at least two individuals perceived by the provider or the recipient to be intended to enhance the well-being of the recipient". According to this definition social support is a process with both provider and recipient (Shumaker & Brownell, 1984, p. 13)

Rosenfeld and Richman (1997) published their model of the social support process and identified the three broad types of social support: tangible (e.g., assisting someone with a task or giving direct assistance), informational (e.g., telling team members they have mutual responsibilities and giving advice) and emotional (e.g., comforting someone and giving encouragement). Social support is typically viewed from the recipient's perspective and is regarded as social support when the recipient perceives the provider's behaviour as enhancing well-being. It is the perceived social support, more than actual received support, that is the most important contributor to health and well-being, according to Sarason, Sarason, and Pierce (1990).

[Insert: Illustration 1, p. 39: The Model of the Social Support Process (Gill, 2000, p. 283):]

The model's eight forms of perceived communicated behaviours are based on several studies (Hardy & Crace, 1993; Pines, Aronson & Kafry, 1981; Richman Rosenfeld & Hardy, 1993; Weiss, 1974) :

- Listening support
- Emotional support
- Emotional challenge
- Task appreciation
- Task challenge
- Reality confirmation
- Tangible assistance
- Personal assistance

According to Gill (2000) other researchers have highlighted different dimensions or specific forms of social support, but the main dimensions stay the same.

The first experiences young children have with sport activities usually occurs within the context of the family (Berlage, 1982). Children in low-income or single-parent families do not usually have the same opportunities as the more privileged children when it comes to being socialised into sports. Sports equipment is scarce, exposure to different kinds of sports is limited when the child grows up in a poor environment. In The President's Council on Physical Fitness and Sports Report (Freedson & Bunker, 1997) it is stated that poorer families cannot afford to invest in health club memberships, exercise machines and equipment for their children. Fitness and sport are often seen as unattainable luxuries rather than a potential resource of income or well-being. In this Report it is also concluded that parental perceptions of the benefits of exercise and athletic participation may also vary by race and class.

Patterns of socialisation into sports are also influenced by parental expectations associated with the sport experience, and parental expectations vary with socio-economic factors such as their incomes, occupations, and educational backgrounds, according to Coakley (1987). Parent-child relationships can be affected either in a positive or a negative way as a result of the interaction associated with sport involvement. When children's sport involvement is used as a source of common interest by the parents their relationships are likely to be enhanced. Pressure to perform can harm the relationship. Singer (1980, p. 501) states as follows: "A society, the big environment, shapes the interests and behaviors of its members". The family exerts an important influence on the way children are introduced to sport, but sources of support outside the family are also important. From the family context the child's attention shifts to a world in which his orientation grows out of being a part of a group of other children whom he accepts as equals. The school then becomes the social system in which the child operates and interacts with other children. The encouragement received from same-sex peers, teachers, coaches, and the community in general plays an important part. Smith, Smoll and Barnett (1995) pointed out the importance of the coach or teacher. The personality characteristics of the teacher affect the social and emotional development and adjustment of children. Mangan (1973) concluded that children constantly get to fill social roles in many different groups, such as classes, clubs, sports teams, student councils, etc., and the experiences in these various groups provide the social and psychological settings and conditions for the development of many aspects of social learning.

Mangan (1973) refers to the importance of the ability to interact and to perform cohesively toward common goals in the sports world. The culture that the child grows up in also plays an important role. Participants of a culture or in a group take on the existing values or norms of the group. Suggestion plays an important role in the formation of attitudes, according to

Singer (1980). Weiss and Ebbeck (1996) proved in their research that there's a tendency for children of different ages to use different information sources as a basis for physical competence judgments. Smaller children (under the age of ten) rely more on adult comments, while peer comparison and evaluation are more important from ages ten to 14, and from ages 16 to 18 children rely more on self-referenced information. Sherif (1935) found that individual subjects are strongly influenced by others in the group, especially by the prestige and leadership qualities of certain group members. Symonds (1948) referred to the need of adolescents to have opportunities for social isolation. He indicated physical education and recreation activities to be important. Mangan (1973) stated that social interaction centres to a large extent around physical skill. It often happens that the child lacking motor skills is barred or not accepted in social participation. Human personality cannot be developed apart from the social group and physical activities of children should be used to develop social learning and a gradual intensification of social consciousness.

Children want action, personal involvement, close scores and challenges and opportunities to reaffirm their friendships in their sport experiences, according to Mangan (1973). The fulfillment of these factors enhances the likelihood that children will develop the kind of relationship that will lead to a high socialisation potential.

In certain cultures boys receive greater social support to participate in sports and it is often linked to their development as men, according to Coakley (1987). He speculates that it may be more influential for Blacks than for Whites, whether it is due to race-related or class-related factors are not clear. Dennis (1940) compared American, Armenian, Arab and Jewish children in Lebanon and found that American children were rewarded with praise for performing in sports and games three times more frequently than were the Arab and Jewish groups. More research is needed to explain the different dynamics of socialisation into sport amongst the various race groups.

Sporting skills can contribute to the development of important social skills. According to Duncan (1997) involvement in sport allows for people to form new acquaintances, consolidate old friendships and learn how to cooperate and negotiate. Mangan (1973) feels that the consequences of sport participation are grounded in the social relationships occasioned by involvement.

Exercise and coping skills

Coping is seen as a critical mediator between stressful events and subsequent reactions, such as emotion and performance (Crocker, Kowalski & Graham, 1998). Lazarus and Folkman defined coping as "...constantly changing cognitive and behavioural efforts to manage specific external and / or internal demands that are appraised as taxing or exceeding the resources of the person (1984, p. 141).

This definition underlines three key features:

- It implies that coping involves a certain amount of effort and planning.
- The outcome of a coping response will not always be positive.
- Coping implies a process that takes place over time.

On the macro level two forms of coping, namely problem-focused coping and emotion-focused coping can be identified (Compas & Epping, 1993; Lazarus & Folkman, 1984). Problem-focused coping can be outer- or inner-directed and are oriented toward altering the situation or the behaviours of others. It refers to cognitive and behavioural efforts used to change the problem or challenge causing the distress whilst inner-directed coping strategies include efforts to reconsider our attitudes and to develop new skills and responses. It implies strategies that help control emotional arousal and distress that are caused by the stressor. Emotion-focused coping is oriented toward managing emotional distress and includes exercise, meditation, expressing feelings and seeking support.

Problem-focused coping can be divided into distinct categories, such as problem-solving, planning, information seeking, suppression of competing behaviour, and increasing efforts. Emotion-focused coping manifests in mental and behavioural withdrawal, denial, relaxation, self-blame, avoidance, acceptance, and wishful thinking (Carver, Scheier & Weintraub, 1989; Compas, Malcarne and Banez, 1992; Folkman & Lazarus, 1990).

According to Antonovsky (1979) good copers are capable of developing skills such as flexibility, farsightedness and rationality. Successful copers use obstacles and life challenges as an opportunity for personal growth, and they attempt to face these challenges with hope, patience and a sense of humour (Kleinke, 1998). Albert Bandura (1986) made the following conclusions about the benefits of being a copers:

- Copers set high goals because they can use various problem-solving skills when things get tough.
- Copers can stay focused on the challenges before them.
- Copers can visualize their possibilities for success.
- Copers have confidence to persevere and they do not settle for mediocre outcomes.
- Copers are future-orientated.
- Copers can reward themselves for success.
- Copers are less troubled by physical and emotional stress because of their problem-solving attitude.

The difference between coping and outcome can be described as follows: an athlete that fails can still be able to cope. The athlete may be attempting to cope with a demanding sporting situation, but he may possibly use the wrong coping strategies for that specific situation. Coping involves both behaviours and thoughts that require effort to manage demanding person-environment transactions (Aldwin, 1994; Lazarus, 1991). Beller (2002) emphasises the role significant people play in an athlete or child's life such as coaches, teachers, parents, administrators, other athletes. These people can play an important role in the development of a child's character and in his ability to cope with life's challenges.

It is clear from the literature that exercise influences various aspects of psychological well-being. Exercise influences physical self-concept which leads to greater physical acceptance and that may lead to a better global self-esteem. The better a person's self-perception is, the better the self-motivation usually is to enhance effort, persistence and achievement. The role of significant others is always important regarding self-concept and social support (Wiese-Bjornstal, 1997). Exercise can also have a moderate effect on cognitive functioning. Attention and concentration abilities in turn have an effect on sport performance. Murphy and Tammen (1998) refer to the difference between successful and unsuccessful performers and that the difference often lies in the ability of a person to exhibit prolonged concentration in activities of some duration. The family context, cultural background, socio-economic circumstances and sporting abilities all contribute to the social support a child receives.

Very limited research has been done in South Africa regarding the influence of sport on psychological components like cognitive skills, attention and concentration, self-esteem and social support in previously disadvantaged communities. This study's aim is to assess the impact of a sport and nutritional programme on these components in previously disadvantaged school-aged rugby players.

Methodology

Empirical design

Research design

It was a multi-disciplinary research study with a randomised, single-blinded, controlled study design. This sub study focused on the effect of a sport development and nutrition intervention programme on the following components of psychological development of previously disadvantaged, primary school-aged rugby players: self-esteem, cognitive development, attention and concentration and social support. The children were randomly assigned to either an experimental group or a control group.

Nature of intervention programme

The experimental group received an exercise intervention and nutritional supplements twice a week for a period of three months. The experimental group was further subdivided into two groups receiving two different supplements. Subjects were not aware that they were receiving different supplements. Each subject received 50 g of the supplement after each training session. Each exercise intervention session consists of structured exercise, namely warm-up exercise, rugby specific exercise, fitness, and ball handling. The nutritional supplement was a sorghum-based drink (sorghum is a cultivated tropical cereal grass, like rice and maize), Morvite®, which consists of pre-cooked sorghum with added vitamins, plus citric acid, sugar and other sweeteners. According to Taylor (2005) one hundred grams of Morvite makes a substantial contribution to the recommended dietary allowance (RDA) for protein, vitamins A, B, C, D and E, and minerals such as calcium, phosphorus, iron and iodine. Each session during this period (April - June 2005) lasted approximately 45 minutes. The control group received no sport intervention or nutritional intervention during this period.

Participants

Primary school boys (n = 205) between the ages of 10 and 13 years were recruited on the basis of availability from six rural primary schools in the Potchefstroom area involved in a rugby development programme. All the schools were located in poor socio-economic communities. The participants were recruited from the various schools and then randomly assigned to an experimental group (n = 92) or a control group (n = 113). These schools are in the Potchefstroom area of the North West Province.

Measuring instruments

Baseline measurements were taken and the same measurements were repeated at the end of the three- month intervention period. Questionnaires were administered by a trained psychologist and a psychometrist. The following questionnaires were used:

The TENNESSEE SELF- CONCEPT SCALE (TSCS-CF)

The TENNESSEE SELF- CONCEPT SCALE (TSCS-CF) (Fitts & Warren, 1996) was originally developed to fill the need for a scale that would be simple to the respondent, broadly applicable, and multidimensional in its description of self-concept. The TSCS is appropriate for use with children in elementary and junior high schools (ages 7 through 14). Each child completed his own questionnaire.

The subscales of the TSCS are the following:

- Inconsistent response (Incr)
- Self-criticism (Sc)
- Faking good (Fakg)
- Physical (Phy)
- Moral (Mor)
- Personal (Per)
- Family (Fam)
- Social (Soc)
- Academic / work (Aca)
- Identity (Ind)
- Satisfaction (Sat)
- Behavior (Bh)

The Child Form consists of 76 self-descriptive statements that allow the individual to portray his or her own self-picture using five response categories.

The SOCIAL SUPPORT AND APPRAISAL SCALE

The Social Support and Appraisal Scale (Dubow & Ullman, 1989) measures the child's

perception of the amount of support he receives from his peers, family and teachers. It provides an index of the general support the child receives. This scale was completed by each child in group context and differentiates between support in the following domains:

- Domain 1 - The family
- Domain 2 - The peer group
- Domain 3 - Teachers

This scale, as designed by Dubow & Ullman (1989) can be completed individually or in group context by children of school going age.

The CATTELL CULTURE FAIR INTELLIGENCE TEST (Scale 2)

The Cattell Culture Fair Intelligence Test (Scale 2) (Cattell & Cattell, 1961) measures the child's cognitive development and general intelligence. It was completed by each child in group context with the aid of a trained psychologist and a psychometrist..

The Culture Fair Intelligence Test measures individual intelligence in a manner designed to reduce the influence of verbal fluency, cultural climate, and educational level. The tests may be administered individually or in a group, and are non-verbal and require only that examinees be able to perceive relationships in shapes and figures.

Scale 2 has been used as it was designed for use with children as young as 8 years, older children and most adults. According to Cattell & Cattell (1961) the entire scale 2 (form A and B) is group administrable.

Biographical Information

According to the biographical questionnaire 33,33% of the participants were 11 years old, 18,52% were 12 years old and 48,15% were 13 years old. A total of 18,52% of the participants were Xhosa speaking, 3,70% were Afrikaans speaking, 3,70% were South-Sotho speaking and 74,07% were Tswana speaking. Their educational language was English 95,65% or Afrikaans 4,35%).

Statistical Analysis

Introduction

The statistical analysis for the study has been done by the Statistical Consultation Service of

the North-West University. Changes from baseline to end within individuals and groups have been assessed by using paired t-tests. The differences in changes from baseline to end between the two groups have been assessed by an analysis of co-variance. Where necessary, differences between groups at baseline have been adjusted. A p-value of less than or equal to 0.05 was regarded as being statistically significant. Cohen's formula for practical significance was used (Cohen, 1988) and a score of more than or equal to 0.8 was regarded as being practically significant. Reliability and validity have been tested by using the Cronbach-Alpha reliability and validity coefficients.

Cronbach-Alpha Reliability and Validity coefficients as indication of intern consistency

According to Huysamen (1996), Cronbach-Alphas can be used for dichotome and multipoint items. The test is based on all possible distributions of a test. It reflects the grade in which all possible distributions measure the same aspect (intern consistency). If the various groups of items in a test measure various concepts, the alpha coefficients will be reduced. A Cronbach-Alpha score of 1.0 suggests good reliability of the measuring instrument. Any score above 0.5 is acceptable and less than 0.5 may indicate uncertainty in reliability.

Practical Significance (effect sizes) versus Statistical Significance (p- values)

Statistical significance tests have, according to Ellis (2003), a tendency to yield small p-values (indicating significance) as the size of the data sets increases. The effect size is independent of sample size and is a measure of practical significance. It can be understood as a large enough effect to be important in practice and is described for differences in means, for the relationship in two-way frequency tables and also for a multiple regression fit.

It is important to comment on the practical significance of results when the results of population data are reported but also in the case of random samples from populations. In this study, available test-samples have been used instead of random samples which caused the p-values to be less important than the effect-sizes. The effect-sizes we used were to obtain the differences of the means of the two independent groups (experimental and control).

The differences in changes from baseline to end between the two independent groups have been assessed by an analysis of co-variance. To conclude: for the purpose of this study a p-value of equal to or less than 0.05 was being regarded as statistically significant and a d-value of more than or equal to 0.8 was being regarded as practically significant.

Ethical approval

All participants were informed verbally and had to complete an informed consent form as to the duration and content of the research project. The study was approved by the North-West University's Ethical Board.

- The main outcomes of the study were communicated to the children, their teachers, coaches and parents.
- The evaluators were a trained psychologist and a psychometrist.
- The questionnaires were translated into Tswana. Questionnaires were available in three languages, namely Afrikaans, English and Tswana.
- During every test session, there were a Tswana, Afrikaans and English interpreter available who facilitated the process and assisted the participants.
- Parents could withdraw their children from the study at any given time.

Results and discussion

Reliability of Measuring Instruments

Test-retest reliability of between 0.65 and 0.93 at the total scores of the Cattell, Social Support Appraisal Scale and Tennessee was recorded which presents satisfactory reliability. Scores less than 0.5 present doubtful reliability of a specific measuring instrument and need to be interpreted with caution. Scores more than or equal to 0,05 were being regarded as reliable.

At the Cattell's Cronbach-Alpha scores (table 1), satisfactory reliability was obtained at both subtests and at the total score. The scores varied between 0.52 and 0.80 which were both more than 0.5.

Subtests where scores less than 0.5 were obtained in the Tennessee Self-Concept Scale (see table 1), were: "faking good" (0.43), "moral" (0.33), "family" (0.48), "social" (0.44), "academic /work" (0.45) and "satisfaction" (0.37). These scores present doubtful reliability

and should be interpreted with caution. It means that this measuring instrument will not present the same scores on these subtests at various test opportunities. The scope of the TSCS' scores varies between 0.33 and 0.76; the bigger the scope the bigger the individual variance. The total Cronbach-Alpha score in the TSCS was 0.78 which presents satisfactory reliability.

The Social Support and Appraisal Scale presents with satisfactory reliability with scores between 0.55 and 0.70 (table 1).

The Cronbach-Alpha scores are displayed in Table 1.

[Insert Table 1, p. 41: Cronbach-Alpha reliability of measuring instruments]

Results of Differences between the experimental and control groups (pre-testing):

Differences between the experimental and control groups during the pre-tests were determined and produced the following results as showed in Table 2 (p. 42):

[Insert Table 2, p. 42: Differences between the experimental and control groups (pre-testing)]

The results of the Cattell Culture Fair Intelligence Test indicated during the pre-tests that the experimental group had a higher score in the Cattell Form A than the control group. (10.44 versus 7.71, $p = 0.0145$). This was not considered as being of practical significance.

In the Tennessee Self-Concept Scale a statistically significant difference between the experimental and control groups during the pre-testing was determined at the subtest "identity" (experimental group: mean = 77.51, standard deviation = 13.95; control group:

mean = 69.67, standard deviation = 15.25; $p=0,0010$). The difference was not practically significant though ($d=0,514$). In the subtest "satisfaction" the experimental group obtained the following scores: mean = 59.37, standard deviation = 7.93. The control group's scores were: mean = 52.18, standard deviation = 10.02 ($p = < 001$; $d = 0.717$). In the subtest "behaviour" the experimental group obtained the following scores: mean = 74.39 and standard deviation = 11.62. The control group scored as follows: mean = 65.72, standard deviation = 13.54 ($p = < 0001$; $d = 0.640$). The scores in the subtest "physical" were as follows: experimental group obtained a mean score of 44.70 and a standard deviation score of 8.44, while the control group's results were as follows: mean = 39.38, standard deviation = 7.94 ($p = 0.0001$; $d = 0.629$). The differences were also statistically significant but not practically significant.. At the subtest "moral" the experimental group scored as follows: mean = 32.54, standard deviation = 6.08, with the control group scoring 29.02 on the mean score and 6.43 on the standard deviation score. The difference was statistically significant ($p = 0,0006$) but not practically significant ($d = 0,547$). The same tendency continued at the subtest "personal" with the experimental group scoring 42.38 on the mean score and 7.21 on the standard deviation score. The control group's results were as follows: mean = 37.81, standard deviation = 9.11 ($p = 0.0006$, $d = 0,502$). The differences are again statistically significant at the subtests "family" (experimental group: mean = 41.20, standard deviation = 6.27; control group: mean = 36.17, standard deviation = 8.13; $p= < 0001$; $d = 0.619$). In the subtest "social" the following scores were obtained: experimental group: mean = 50.44, standard deviation = 7.55 and control group: mean = 45.19, standard deviation = 8.10 ($p = < 0001$; $d = 0.647$). The scores were as follows in the subtest "academic/work": experimental group: mean score = 37.07, standard deviation = 5.89; control group: mean = 33.56, standard deviation = 8.39 ($p = 0.0026$; $d = 0.417$). At the "inconsistent response" subtest the difference was also statistically significant ($p = 0,0140$) but not practically significant ($d = 0,394$) with the following scores: experimental group: mean = 71.67, standard deviation = 11.06; control group: mean = 67.18, standard deviation = 11.43. The "total" score presents also with a statistically significant difference between the two groups at the pre-testing of < 0001 without being practically significant ($d = 0,682$). The scores obtained were as follows: experimental group: mean = 248.35, standard deviation = 32.36; control group: mean = 221.15, standard deviation = 39.85. No practically significant differences between the experimental and control groups during the pre-testing at the Tennessee Self-Concept Scale were determined, although the experimental group obtained higher scores at 11 of the 13 subtests.

No statistically significant differences between the two groups were determined during the pre-testing at the Social Support and Appraisal Scale's 3 subcategories or total score (table 2).

Intra-group results of experimental and control groups (pre-test and post-test results):

[Insert table 3, p. 43 + 44]

Within the experimental group the changes from baseline to end delivered no statistically or practically significant results at the Cattell Culture Fair Intelligence Test. All p-value scores were above 0,05 (Form A = 0.748; Form B = 0.196; Total = 0.267). Saigal et al. (1991) found no link between motor development or abilities and cognitive development and abilities. Researchers differ on this point with some supporting the findings of Saigal et al. and others supporting the belief that physical activities have an effect on cognitive development (Louw et al., 1998; Burns, 2004). The duration of the study (being 12 weeks) was probably too short to obtain markable results. According to the American College of Sports Medicine (ACSM) (1978) a minimal programme duration of 15 – 20 weeks is necessary before physical training effects are fully realised.

Regarding the results obtained on the Social Support and Appraisal Scale, no statistically or practically significant test results within the experimental group were scored from baseline to end (see table 3). Berlage (1982) as well as Nedalsky (1951) stated that the first experiences young children have with sport activities usually occur within the context of the family. In the case of this study with all participants coming from the previously disadvantaged community, the social system's priority is focused on survival and material needs rather than on sport participation and relaxation. Low-income or single-parent families do not have, according to Coakley (1987), the same opportunities as the more privileged children when it comes to being socialised into sports. Exposure to different kinds of sports is limited when the child grows up in a poor environment. Such an environment also influences the role that significant others like parents, peers, family and coaches, can play in a child's life. Economic survival (physiological need for shelter, food and warmth) is more

important than a secondary need like sport participation (ego need to obtain self respect, personal worth and autonomy and the need for self actualisation), according to Maslow's hierarchy of needs (Maslow, 1954). The family's opinion of the child is critically important in the improvement of self-esteem. It becomes a cyclic relationship, according to Wiese-Bjornstal (1997, p. 23), in that better perception of oneself and one's abilities lead to enhanced effort, persistence and achievement, which in turn improve self-perceptions even more.

Within the experimental group the changes from baseline to end delivered statistically significant results at the following Tennessee Self-concept Scale's subtests (see table 3): "self-criticism" (p-value = 0.028; d = 0.293), "identity" (p-value = 0,.0001; d = 0.535), "satisfaction" (p-value = <0001; d = 0.635),"behaviour" (p-value = < 0003; d = 0.498), "physical" (p-value = 0.0002; d = 0.518, "personal" (p-value = 0,.0001; d = 0.595), the changes were statistically significant but not practically significant (0,595), "family" (p- value: 0.0009; d = 0.453), "social" (p-value = < 0001; d = 0.727), "academic / work" (p-value = 0.0001; d= 0.629), "inconsistent response" (p-value = 0.002; d = 0.417), "total" score (p-value= < 0001; d = 0.695), "faking good" (p = 0.944; d = 0.009). It is important to note the improvement in self-concept that occurred within the experimental group from baseline to end versus no improvement in results, regarding self-concept, within the control group.

This improvement in self-concept scores correlates with the statement of Fox (2000a) that exercise first influences physical self-concept so that people can develop a higher degree of physical acceptance. This should then lead to a better global self-esteem. The participants came into contact with coaches and others interested in fitness and that may have encouraged the continuation of these behaviours. The social contact may be a mechanism of change for self-esteem, according to Koniak-Griffin (1994) and Palmer (1995). They mentioned in their research that it is not certain whether the improvements in self-esteem are directly related to engaging in physical activity versus engaging in any positive goal-orientated activity.

Although there was a clear improvement in the experimental group's results regarding self-concept from baseline to end, it still lacks to be practically significant. The intervention period of 12 weeks was probably too short to produce practically significant results. The American College of Sports Medicine guidelines (1978) specifies a minimal programme duration of 15 – 20 weeks before physical training effects are fully realised. The duration may have an effect on the accuracy of more specific self-perceptions. Serial measurement over a 1- 2 year period is expected to produce better functional results in terms of the manner in which self-esteem may be affected.

Within the control group the changes from baseline to end delivered no statistically or practically significant test results at Form A of the Cattell Culture Fair Intelligence Test (see table 3). At Form B and total score of the Cattell the p-value was less than 0,05 and thus statistically significant. These two scores were not practically significant though (see table 3).

Regarding the Social Support and Appraisal Scale the three subtests' scores were not statistically or practically significant.

Within the control group the changes from baseline to end delivered no statistically or practically significant results at the Tennessee Self-concept Scale.

The experimental group delivered more significant results from baseline to end on a statistical level than the control group at the Tennessee Self-concept Scale. With a longer duration of the program more practical significant results could possibly have been obtained.

Intergroup results of experimental and control groups (post-testing):

[Insert Table 4, p. 45]

The differences in changes from baseline to end between the experimental and control groups have been assessed by an analysis of co-variance. Where necessary, differences between groups at baseline have been adjusted (see table 4).

No statistically or practically significant p-values changes were found at the Cattell Culture Fair Intelligence Test Form A, Form B and Total score as well as the 3 subtests of the Social Support and Appraisal Scale. These results are in correlation with the findings of Saigal, Rosenbaum, Szatmari and Campbell (1991) that there is not necessarily a link between motor abilities and cognitive performance. Singer (1980) also refers to research findings that show a low correlation between motor skill achievement and intelligence in adults and older school-aged children. The largest effect occurs in early childhood and in older age (Etnier, Salazar, Landers, Petruzello, Myungwoo and Nowell, 1997). The age of the children (48%

were 13 years, 18.52 % were 12 years and 33,33% were 11 years) could probably have had an effect on the results (being in their mid-childhood years). The poor socio-economic circumstances of the participants may also have influenced their results, as been mentioned earlier.

At the Tennessee Self-Concept Scale no practically significant changes were found. The following subtests showed statistical significant changes: "physical" ($p = 0.03$; $d = 0.419$), "academic / work" ($p = 0.01$; $d = 0.491$), "inconsistent response" ($p = 0.03$; $d = 0.398$), "faking good" ($p = 0.031$; $d = 0.406$) and at the "total" score ($p = 0.03$; $d = 0.415$). In comparison to the control group, the experimental group showed some improvement regarding self-concept measurement. Instead of outscoring the experimental group in 10 of the 13 subtests of the TSCS, they obtained higher scores in only 5 subtests at the post-testing compared to the pre-testing scores.

The Cronbach-Alpha scores on the subtest "academic/ work" and "faking good" were less than 0,5 and need to be interpreted with caution because of doubtful reliability of the measuring instrument.

Summary and conclusions

The relevant hypotheses were:

- The experimental group's cognitive functioning, concentration and attention skills will have improved after the intervention.
- At the end of the intervention the experimental group will have a higher self-esteem.
- The experimental group will have better social support at the end of the intervention.

Researchers differ on the point of the effect of exercise on cognitive functioning. The majority of researchers feel that exercise produces a moderate improvement in cognitive functioning and may in many instances be associated with improved academic performance (Bailey, 2004), where the second group found no link between motor development or abilities and cognitive development and abilities (Saigal et al., 1991). This study found no improvement in results regarding cognitive functioning, attention and concentration skills. The duration of the intervention programme may also have influenced the result (as discussed previously). Hypothesis 1 was rejected.

Hypotheses 2, regarding the self-esteem of the experimental group, cannot be fully rejected.

Although no practically significant results were obtained, the results of the experimental group at the Tennessee Self-Concept Scale improved in 11 of the 13 subtests from baseline to end. Within the control group no improvement occurred from baseline to end. At the post-test results there was also an improvement in the results of the experimental group regarding self-esteem in comparison to the control group. Where the experimental group outscored the control group at the pre-tests of the TSCS in 11 of the 13 subtests, they produced better marks at only 5 subtests at the post-testing. It is important to note that the subtests where better scores were obtained by the control group are "faking good", "inconsistent response", "academic/work", "physical" and at the "total" score. It must be taken into account that the Cronbach-Alpha scores on the subtests "academic/work" and "faking good" were less than 0,5 and need to be interpreted with caution because of doubtful reliability of the measuring instrument. The remaining subtests where the control group produced higher scores were "inconsistent response", "physical" and the "total" score.

The hypothesis regarding social support is rejected and the reason could be the participants' socio-economic circumstances. Maslow's hierarchy of needs provides a possible clue in the understanding of the less important role structured sport participation plays in less-advantaged communities. Children in low-income families do not usually have the opportunities as the more privileged children when it comes to being socialised into sports. Patterns of socialisation into sports are also influenced by parental expectations associated with the sport experience, and parental expectations vary with socio-economic factors such as their incomes, occupations and educational backgrounds (Coakley, 1987).

The following practical problems could have influenced the outcome of the study:

- the participants' educational level was generally low, considering the fact that they experienced big difficulties in handling the test material and completing the questionnaires by themselves. The writing of their own and their school's names posed a problem.
- A total of 74,07% of the participants were Tswana speaking but their educational language was English. They experienced difficulties in reading and writing in Tswana. The participants are being educated in their second language, and not their language of preference.
- The variety of tests that was done with the children (psychometric tests, as well as tests from nutrition's side and from biokinetics), influenced the children's willingness to stay motivated.
- The disciplinary level of the participants was generally on a very poor level.

Instructions had to be repeated constantly.

The second possible reason for the obtained results is the duration of the programme. A minimal programme duration of 15 – 20 weeks before physical training effects are fully realized, is recommended by the American College of Sports Medicine (1978). Serial measurement over a 1 – 2 year period is according to them projected as better able to delineate the manner in which self-esteem may be affected by exercise.

Thirdly, the fact that the participants were from the previously disadvantaged communities could have contributed to the outcome of the study. Meyers and Taylor (1998) refer to the effect of poverty, single-parent families, alcohol and drug abuse and unemployment on the psychological well-being of children.

Sport and nutrition are important factors in the physiological, sociological and psychological development of a child. Because of the majority of South Africans' poor socio-economic circumstances, both aspects have not been fully developed and need much more attention and research. Sport participation can make a huge difference in a child's life, it can enhance his/her self-esteem and contribute to his/her general well-being. Research in a third world country like South Africa presents with it's own distinctive problems and need to be evaluated in context.

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Illustration 1: The Model of the Social Support Process (Gill, 2000, p. 283):

Provider
(Team, coaches, support personnel, friends, family)

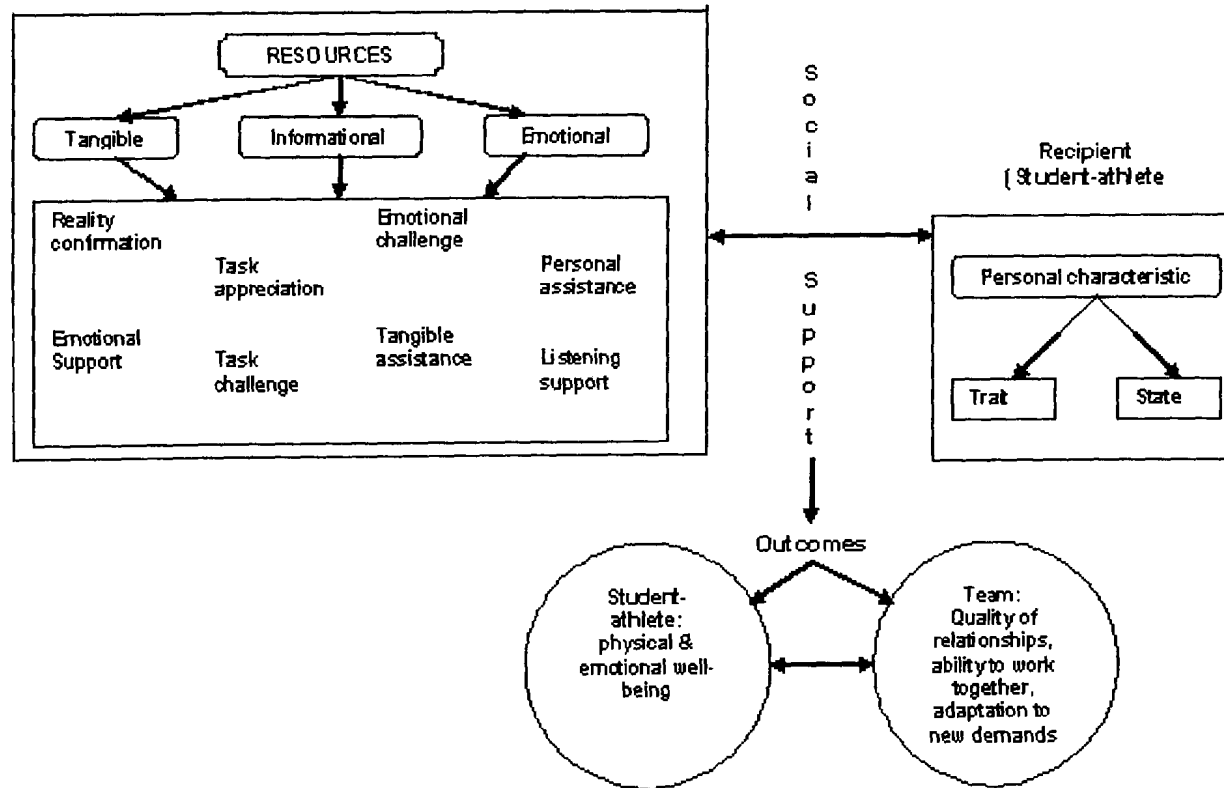


Table 1: Cronbach-Alpha reliability of measuring instruments:

	<u>TEST DESCRIPTION</u>	<u>VARIABLES</u>	<u>CRONBACH ALPHA COEFFICIENT</u>
Cattell	Culture Fair Intelligence Test - Form A	46	0,80
	Culture Fair Intelligence Test – Form B	46	0,52
	<i>Culture Fair Intelligence Test – Total Score</i>	92	0,72
Tennessee	Inconsistent Response	20	0,57
	Self-Criticism	8	0,60
	Faking Good	7	0,43*
	Physical	12	0,55
	Moral	10	0,33*
	Personal	11	0,64
	Family	11	0,48*
	Social	14	0,44*
	Academic /Work	10	0,45*
	Identity	20	,76
	Satisfaction	17	,37*
	Behaviour	21	,66
	Total Score	76	0,78
Social Support	Peer Reliability	19	0,70
And Appraisal	Family Reliability	12	0,65
Scale	Teacher Reliability	10	0,55
	Total Score	41	

Where:

• : Scores less than 0,5 (present doubtful reliability of the measuring instrument)

Table 2: Results of differences between the experimental and control groups (pre-testing):

TEST	EKSPERIMENTAL			CONTROL			p-VALUE	EFFECT SIZE
	n	Mean	SD	n	Mean	SD		
Cattell Culture Fair Intelligence Test - Form A	92	10.44	8.10	113	7.71	7.56	0.0145*	0.337
Cattell Culture Fair Intelligence Test - Form B	92	13.00	10.86	113	11.24	11.04	0.2521	0.159
Cattell Culture Fair Intelligence Test- Total	92	23.44	16.68	113	18.96	16.92	0.0586	0.256
Social Support and Appraisal Scale : Peer Reliability		52.88	13.15		54.98	9.85	0.3134	0.159
Family Reliability		30.61	9.09		32.71	6.05	0.1352	0.283
Teacher Reliability		27.89	7.28		28.40	5.56	0.6579	0.081
Total Score	55			85				
Tennessee Self-Concept Scale: Self-Criticism	68	22.04	6.91	88	22.87	6.38	0.446	0.119
Identity	68	77.51	13.95	88	69.67	15.25	0.0010*	0.514
Satisfaction	68	59.37	7.93	88	52.18	10.02	<001*	0.717
Behaviour	68	74.39	11.62	88	65.72	13.53	<0001*	0.640
Physical	68	44.70	8.44	88	39.38	7.94	0.0001*	0.629
Moral	68	32.54	6.08	88	29.02	6.43	0.0006*	0.547
Personal	68	42.38	7.21	88	37.81	9.11	0.0006*	0.502
Family	68	41.20	6.27	88	36.17	8.13	<0001*	0.619
Social	68	50.44	7.55	88	45.19	8.10	<0001*	0.647
Academic/ Work	68	37.07	5.89	88	33.56	8.39	0.0026*	0.417
Inconsistent Response	68	71.67	11.06	88	67.18	11.43	0.0140*	0.394
Total	68	248.35	32.36	88	221.15	39.85	<0001*	0.682
Faking good	68	25.57	5.09	88	25.10	5.25	0.5726	0.089

Where:

SD : Standard Deviation

* : Statistically significant scores with $p \leq 0,05$

Table 3: Intragroup results of experimental and control groups (pre-tests and post- tests):

Experimental group

TEST	n	MEAN DIFFERENCE	SD OF DIFFERENCE	p-VALUE	EFFECT SIZE
Cattell Culture Fair Intelligence Test – Form A	92	0.28	8.44	0.748	0.033
Cattell Culture Fair Intelligence Test – Form B	92	1.92	14.15	0.196	0.136
Cattell Culture Fair Intelligence Test Total	92	2.20	18.93	0.267	0.116
Social Support and Appraisal Scale: Peer Reliability	56	1.64	15.00	0.458	0.109
Family Reliability	56	2.38	11.17	0.151	0.212
Teacher Reliability	56	1.69	8.01	0.158	0.211
Tennessee Self-Concept Scale: self criticism	59	2.15	7.34	0.028*	0.293
Identity	59	-8.93	16.68	0.0001*	0.535
Satisfaction	59	-6.14	9.66	<.0001*	-0.635
Behaviour	59	-7.39	14.84	0.0003*	-0.498
Physical	59	-5.17	9.98	0.0002*	-0.518
Moral	59	-1.71	8.24	0.1159	-0.207
Personal	59	-5.48	9.20	<.0001*	-0.595
Famil	59	-3.52	7.77	0.0009*	-0.453
Social	59	-6.58	9.04	<.0001*	-0.727
Academic/ work	59	-5.37	8.52	<.0001*	-0.629
Inconsistent response	59	-6.29	15.06	<.002*	-0.417
Total	59	-27.83	40.00	<.0001*	-0.695
Faking Good	59	0.05	5.56	0.944	0.009

Control group

TEST	n	MEAN DIFFERENCE	STD. DEV. OF DIFFERENCE	P-VALUE	EFFECT SIZE
Cattell Culture Fair Intelligence Test – Form A	113	1.28	7.95	0.149	0.136
Cattell Culture Fair Intelligence Test – Form B	113	2.76	14.43	0.044*	0.191
Cattell Culture Fair Intelligence Test - Total	113	3.85	20.14	0.044*	0.191
Social Support and Appraisal Scale: Peer Reliability	56	0.27	11.41	0.857	0.024
Family Reliability	56	-0.11	6.85	0.902	-0.016
Teacher Reliability	56	0.80	6.97	0.392	0.115
Tennessee Self-Concept Scale: Self criticism	56	1.34	6.78	0.145	0.197
Identity	56	-1.62	14.71	0.412	-0.110
Satisfaction	56	2.03	11.60	0.194	0.175
Behaviour	56	3.34	16.03	0.124	0.208
Physical	56	1.87	8.91	0.121	0.210
Moral	56	2.04	7.76	0.054	0.262
Personal	56	-1.32	10.74	0.361	-0.123
Family	56	1.82	8.58	0.117	0.212
Social	56	-0.66	9.60	0.608	-0.068
Academic/ work	56	0.82	10.08	0.544	0.081
Inconsistent response	56	0.91	11.78	0.565	0.077
Total	56	4.57	42.43	0.423	0.108
Faking Good	56	1.34	5.58	0.078	0.240

Where: SD : Standard Deviation

* : Statistically significant score with $p \leq 0,05$

Table 4: Intergroup results of experimental and control groups (post-testing):

TEST	ADJUSTED MEANS		MSE	P-VALUE	EFFECT SIZE
	Experimental Group	Control Group			
Cattell Culture Fair Intelligence Test – Form A	10.14	9.38	46.83	0.433	
Cattell Culture Fair Intelligence Test – Form B	14.63	14.29	150.97	0.84	
Cattell Culture Fair Intelligence Test -Total	24.63	23.81	300.36	0.74	
Social Support and Appraisal Scale: Peer Reliability	55.57	54.80	66.14	0.63	
Family Reliability	33.06	32.04	47.13	0.46	
Teacher Reliability	30.07	29.72	24.28	0.76	
Tennessee Self-Concept Scale : Self criticism	23.75	24.04	26.27	0.76	
Identity	68.60	71.06	126.29	0.25	
Satisfaction	53.06	55.84	64.19	0.08	
Behaviour	66.09	69.58	143.49	0.14	
Physical	39.83	42.69	46.55	0.03*	0.419
Moral	30.55	30.83	35.74	0.80	
Personal	37.07	37.88	54.01	0.57	
Family	36.98	39.16	41.18	0.08	
Social	43.75	45.49	48.03	0.20	
Academic/ work	31.84	35.16	45.56	0.01*	0.491
Inconsistent response	65.51	69.85	119.03	0.03*	0.398
Total	219.13	232.11	977.90	0.03*	0.415
Faking good	25.14	26.81	16.84	0.031*	0.406

Where:

MSE : Mean square error

SD : Standard Deviation

* : Statistically significant score with $p \leq 0.05$