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THE EFFECT OF GENDER AND ETHNIC DIFFERENCES ON THE SUCCESS OF INTERVENTION PROGRAMMES FOR THE MOTOR PROFICIENCY AND SELF-CONCEPT OF 7-9 YEAR OLD DCD CHILDREN

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ABSTRACT

More boys than girls are diagnosed with DCD (Maldonadoo-Duran, 2002), while boys have a higher global (Davies & Brember, 1999) and physical self-concept (Crocker et al., 2000) than girls. However, no literature exists with regard to ethical differences. Teachers identified 201 potential DCD candidates. The Movement Assessment Battery for Children (Henderson & Sugden, 1992) identified 58 with DCD (36 boys and 22 girls). The Tennessee Self-Concept Scale (Child Form) (Fitts & Warren, 1996) and Child Anxiety Scale (Gillis, 1980) were administered to determine the children's self-concept and anxiety respectively. A four-group pretest-posttest, with two follow-up tests was used. Children were randomly grouped into experimental groups (motor based intervention, self-concept enhancing intervention, integrated psycho-motor intervention and control group). A repeated measures ANOVA was used to determine interactions within the groups, independent t-tests to determine gender differences and a one-way ANOVA to determine differences between the ethnic groups. The self-concept of the girls in the psychological group improved moderately significantly (p=0.09) more than that of the boys, while the white children's motor proficiency (motor based intervention group) improved significantly more than the black children's. These differences were, however, not large enough to justify different intervention programmes for different ethnic groups and genders.

Key words: Gender; Ethnic; Race; Children; DCD.

INTRODUCTION

Children with Developmental Coordination Disorder (DCD) experience problems with a variety of tasks (Fox & Lent, 1996) and activities (Henderson & Sugden, 1992) in their daily routine. Various non-motor problems are also associated with DCD (Piek *et al.*, 2000; Skinner & Piek, 2001). The development of a poor self-concept (Colchico *et al*., 2000; Goni & Zulaika, 2000; Peens *et al.*, 2004; Skinner & Piek, 2001) and poor physical self-perception (Piek *et al*., 2000; Skinner & Piek, 2001) are two of these.

It is generally found that a higher percentage of boys are diagnosed with DCD (Henderson & Sugden, 1992; Maldonadoo-Duran, 2002; Missiuna, 1994; Sugden & Sugden, 1991), than girls, although Dussart (1994) indicated no relationship between DCD and gender. Similar findings have been reported in connection with gender and self-concept. Some researchers report no differences in the self-concept of boys and girls (Bosacki *et al.*, 1997; Keltikangas-Jarvinen, 1990), while Bosacki *et al.* (1997) found a slightly higher self-concept among girls.

Most researchers, however, found that boys have a higher global (Davies & Brember, 1999; Garcia *et al.*, 1995; Stein *et al.*, 1998) as well as physical self-concept (Crocker *et al.*, 2000; Hagger *et al.*, 1998; Smith & Croom, 2000; Stein *et al.*, 1998) than girls. Ohannessian *et al.* (1999) further states that a significantly higher level of self-competence is reported in boys than girls. However, no research findings regarding a relationship between ethnic differences and the success of intervention were found.

These findings indicate that there are differences between boys and girls with regard to their self-concept and motor proficiency. However when the effect of intervention programmes to improve self-concept or motor proficiency on the two genders were analyzed, no significant gender differences were found after motor skill intervention (Emmanouel *et al.*, 1992; Goodway & Rudisill, 1996). In general, it is found that motor intervention could enhance the motor proficiency and self-concept of children (Goni & Zulaika, 2000).

From these literature findings it is clear that motor intervention will most probably enhance the motor proficiency and self-concept of DCD-children. Although there is limited research in this field it seems that boys and girls do not react differently to motor intervention. The effect of gender and ethnic groups on the success of a purely motor based intervention, integrated psycho-motor intervention and psychological intervention will be analyzed in this study.

METHODOLOGY

Participants

Four hundred and thirteen (413) potential DCD candidates in the age group seven to nine years were identified by class teachers (n=78) from the nine different primary schools in the Potchefstroom district in the Northwest Province of South Africa, in accordance to guidelines set by the researcher. Parents of 201 of these children gave informed consent for participation in the study. The Movement Assessment Battery for Children (MABC) was used to determine their DCD state. Of the 201 children, 71 were classified as falling into the DCD group. One child was excluded because of possible mental retardation and another two because of incomplete test results. The children were then randomly divided into four groups. A statistical equation [$n=(1.96)^2(6.52)^2/(3,75)^2$] (Steyn *et al*., 1998), based on relevant results (Ernst, 2004), determined that each of these groups should consist of at least 11.6 (n=12) children in order for the results to have statistical power. The technique of paring in order to randomly allocate DCD-children of the same age, gender and ethnic group in each of the four different groups was recommended by a statistician. However, practical considerations such as different venues (schools) where the intervention programmes had to be conducted were problems experienced by the researchers. Therefore the number of children in each group differed. It was however recommended that subjects should not be excluded in order to even the groups. After the intervention programme and a lapse of two months, two more children were excluded from the study due to relocation. Another eight children were excluded one year later for the final test due to the same reason, resulting in 58 children on whom this study was conducted. The number of children in each gender and ethnic group and in each intervention group (1-4) is reported in Table 1.

TABLE 1. **NUMBER OF CHILDREN IN EACH GENDER AND ETHNIC GROUP IN EACH INTERVENTION GROUP**

Ethnic group	White		Black		Coloured		
Gender	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Total**
Group 1	5	4	6	2	3	0	**20**
Group 2	2	3	2	1	1	1	**10**
Group 3	1	1	1	1	3	4	**11**
Group 4	6	2	4	0	2	3	**17**
Total	14	10	13	4	9	8	**58**

Group 1: Motor based intervention; Group 2: Psychological intervention; Group 3: Integrated psycho-motor intervention; Group 4: Control group.

Measuring instruments

Movement Assessment Battery for Children (MABC)

The measuring instrument that was used in this study was the MABC (Henderson & Sugden, 1992), which has good reliability and can be used on children 4-12 years of age. The MABC tests manual dexterity (MD) (three tests), ball skills (BS) (two tests) and balance skills (BAS) (three tests). Each of the three sub-scores can be calculated separately or combined as a total score. The higher the score, the lower the child's motor ability will be. The test is a norm based test and children on or under the 5th percentile are classified as children with DCD who need intervention. Children that fall above the 5th but on or under the 15th percentile are at risk of having DCD and may need intervention later in life. All children in this study scored on or under the 15th percentile. The primary researcher (A kinderkineticist) was responsible for this part of the study.

The Tennessee Self-Concept Scale (Child Form) (TSCS-CF)

The TSCS-CF (Fitts & Warren, 1996) is a questionnaire which consists of 76 self-descriptive statements that allow the individual to portray his/her own self-picture using five response categories, namely "Always False", "Mostly False", "Partly False and Partly True", "Mostly True" and "Always True". The Child Form can be completed by children 7-14 years who can read at a second-grade level or higher. This form evaluates four validity scores (Inconsistent Responding, Self-Criticism, Faking Good, and Response Distribution), two summary scores (Total Self-Concept and Conflict), six self-concept scores [Physical (PHY), Moral (MOR), Personal (PER), Family (FAM), Social (SOC) and Academic/Work (ACA)] and three supplementary scores (Identity, Satisfaction and Behaviour) (Fitts & Warren, 1996). Each of the six self-concept scores can be calculated individually or combined as a Total Self-Concept Score. The TSCS-CF shows good internal consistency 0.73 (median), and the test-retest reliability is 0.74 (median) (Fitts & Warren, 1996). The higher the score, the higher the self-concept will be. A median for the total score can be set between 256 and 260. A psychologist was responsible for carrying out these tests.

Child Anxiety Scale (CAS)

The CAS is a self-report questionnaire to determine the anxiety of children 5-12 years of age (Gillis, 1980). This questionnaire consists of 20 questions and shows a good reliability coefficient of r=0.81. (Gillis, 1980). According to the question being asked, the child is requested to make an X on the appropriate circle (either red or blue). After completion of the test, an answering key is placed over the answer sheet so that the Xs show through the circles. The Xs are counted to form the raw score which is then converted into a standard score. The higher the score, the higher the child's anxiety will be. A psychologist was responsible for carrying out these tests.

Procedure

All headmasters of the nine primary schools in the Potchefstroom district were visited to obtain permission for the study to be conducted at their schools. After permission was granted, teachers of children in the age range 7-9 years received a letter explaining the characteristics of a DCD-child to help them identify potential candidates. They identified four hundred and thirteen (413) children with such characteristics. An informed consent document was then sent to the parents of these children to ask permission for the children to participate in the study. All the identified children whose parents gave informed consent (n=201) were evaluated with the MABC, during school hours, to determine their DCD status. After confirmation of DCD, the children with DCD (n=71) were tested with the TSCS-CF and the CAS, so as to determine their functioning regarding self-concept and anxiety. One of the children was, however, excluded from the study because of possible mental retardation. Test results of another two children were incomplete and thus also excluded. The remaining children (n=68) were then randomly divided into four groups [experimental group 1 (motor based intervention programme), experimental group 2 (psychological intervention programme), experimental group 3 (integrated psycho-motor intervention programme) and control group (no intervention)].

After completion of the motor based intervention programme (eight weeks for 30 minutes twice a week), the psychological intervention programme (eight weeks for 45 minutes once a week) and the integrated psycho-motor intervention (children in this intervention group followed both the motor and psychological intervention programmes). All subjects (including the control group) were again tested (posttest) with the MABC to determine the effect of the motor based intervention programme on their motor proficiency. The lasting effect of the programmes on the motor proficiency, self-concept and anxiety were retested after a lapse of two months without any intervention. In this retest, where children completed the MABC, TSCS-CF and CAS, only 66 children were tested because two moved out of town. In a second retest, a year later, the children completed the MABC to determine the lasting effect of the programmes on the children's motor proficiency after a year without any intervention. In this retest there were only 58 children because of the relocation of a further eight. The MABC was administered by the primary researcher (Kinderkineticist), while the psychological testing was administered by a registered psychologist.

When analyzing the MABC, TSCS and CAS scores, an adjusted mean was calculated. The total of the final testing session was subtracted from the total of the first testing session in order to get an adjusted mean score. With the MABC, a lower score indicates a higher motor proficiency, thus a negative adjusted mean score indicates improvement while a positive score

indicates a decrease in motor proficiency. However, with regard to the TSCS a positive score indicates an increase in self-concept and for the CAS, a negative score indicates a decrease in anxiety.

Intervention programmes

Motor based intervention programme

The motor based intervention programme involved the integration of different motor interventions. The task-specific intervention, kinaesthetic intervention and sensory integration treatment methods were integrated. The session started with a loco motor activity combined with vestibular movement and kinaesthetic training (for example rolling, skipping, hopping, jumping, galloping and animal walks – all these activities were also done while turning). The rest of the content was divided into different sections [ball skills (2-3 activities), balance skills (2-3 activities), fine motor coordination (2-3 activities) and eye movement activities (1-2 activities)]. Each session included all these components. Task specific intervention was used to treat the ball and balance skills. All the activities were done in a group except for the eye movement activities that were done individually with each child. The genders and ethnic groups were not separated, so both boys and girls and all the ethnic groups were subjected to the same motor intervention programme. The primary researcher compiled and conducted the programme which was progressively adapted once a week. A sample of two lesson plans follow.

Lesson 9 (Tuesday)

Introductory activities
Fundamental skills (± 5 minutes)
(Vestibular and kinaesthesia)

- Baboon walk.
- Crab walk.
- Frog jumps.
- All of the above were also done while turning.

Balance (± 5 minutes)

- Walk on stilts over bean bags and inside hoops.
- Stand on one leg with eyes open and closed.
- Walk over bridge.

Ball skills (eye-hand-coordination)
(± 5 minutes)

- Hit tennis ball with cricket bat.
- Throw ball against wall and catch.
- Throw and catch ball.

Fine motor skills (Manual dexterity)
(± 5 minutes)

- Copy small figures.

Lesson 10 (Thursday)

Introductory activities
Fundamental skills (± 5 minutes)
(Vestibular and kinaesthesia)

- Glide (sideways).
- Leap.
- Galloping.
- Animal walks from lesson 9 backwards and turning.

Balance (± 5 minutes)

- Walk heel-to-toe forward and backwards over balancing beam.
- Skipping with a hoop.
- Balance on different body parts (ex. hand and knee, hand and foot).

Ball skills (eye-hand-coordination)
(± 5 minutes)

- Throw and catch bean bag.
- Throw bean bag in hoop.
- Two-two friends throw and catch bean bag.

Fine motor skills (Manual dexterity)
(± 5 minutes)

- Walk on path with fingers.

- Finger tapping.

Eye control (± 5 minutes)

- Follow bubbles with eyes.
- Follow ball on rope with eyes.
- Put two-two washing pins together.

Eye control (± 5 minutes)

- Hold little object and child focus with both eyes, then left and right eye separately.
- Tracking with both eyes around a square and triangle.

Psychological intervention programme

The self-concept enhancing intervention programme was centred around discovering the self – "Who am I?" Enhancing and enriching the self-concept through awareness, uniqueness, individuality, competence, virtue (enriching self-esteem), belonging, interpersonal relations, handling anxiety, as well as a session for the parents on parenting skills were also involved in the programme (Hugo, 2005). The gender and ethnic groups were not separated, and thus received the same intervention programme. The psychologist responsible for this part of the study conducted the programme.

Statistical procedure

For the statistical analysis, the Statistica 5.5 (STAT 99) for Windows 2005 computer package was used (Statsoft, 2005). Information was analyzed for descriptive purposes through means (M), standard deviations (SD) and maximum and minimum values. A repeated measures analysis of variance was conducted to determine the interaction between gender, race, group and the different testing opportunities. An independent t-test was done to determine possible differences between the two genders, while a one-way ANOVA followed by an Unequal N HSD post-hoc analysis was conducted to determine differences between the different ethnic groups. The level for significant differences was a p-value of equal of smaller than 0.05 ($p \leq 0.05$).

Ethical consideration

The ethics committee of the North-West University gave approval for this study.

RESULTS

For the first step in analyzing the data a repeated measures analysis of variance was used to determine possible interactions between ethnic group, intervention group and different testing opportunities (MABC, TSCS and CAS), as well as between gender, intervention group and different testing opportunities (MABC, TSCS and CAS). This analysis was divided into two sections due to the ethnicity of two of the groups. The analysis for the MABC and the interaction between gender, intervention group and testing opportunities, a significant interaction was found between intervention group and testing opportunity [$F(3;150)=3.70(p=0.00)$]. For the interaction between ethnic group, intervention group and testing opportunity a significant interaction was documented between ethnic group and testing opportunity $F(3;138)=2.4501(p=0.03)$.

For the interaction between gender, intervention group and different testing opportunities as well as ethnic group, intervention group and different testing opportunities with regard to the

TSCS, significant interactions were documented between intervention group and testing opportunities [F(1;50)=6.75(p=0.00) and F(1;46)=3.11(p=0.04) respectively]. With regard to CAS no significant interactions were found between ethnic group, intervention group and different testing opportunities, but a significant interaction F(1;50)3.17(p=0.03) for gender and the intervention group, was found between gender, intervention group and different testing opportunities. Due to limited space, these results will not be presented in a table.

Although no significant interactions were found in the repeated measures analysis of variance between intervention group and gender, it seemed necessary to determine whether the genders differ after completion of an intervention programme. Therefore, as a next step, an independent t-test was conducted to analyze differences between the genders in order to determine which gender in which intervention group showed the best improvement after having participated in an intervention programme. The above-mentioned results are shown in Table 2.

TABLE 2. **SIGNIFICANCE OF DIFFERENCES BETWEEN BOYS AND GIRLS FOR THE DIFFERENT TESTS**

Test	Adjusted Mean Girls	Adjusted Mean Boys	SD-Girls	SD-Boys	t-value	df	p-value
Group 1							
MABC	-10.92	-9.25	9.07	5.60	-0.51	18	0.62
TSCS	-18.33	10.21	61.90	38.75	-1.26	18	0.22
CAS	-0.17	0.21	6.82	4.87	-0.14	18	0.89
Group 2							
MABC	1.00	-0.90	9.46	3.85	0.42	8	0.69
TSCS	52.60	30.00	24.88	10.22	1.88	8	0.09*
CAS	-2.80	0.20	5.54	7.01	-0.75	8	0.66
Group 3							
MABC	-9.67	-6.20	5.31	4.40	-1.16	9	0.27
TSCS	60.67	49.80	28.16	29.63	0.62	9	0.55
CAS	-0.33	-0.60	7.37	1.67	0.08	9	0.94
Group 4							
MABC	-5.10	-6.75	2.86	4.96	0.69	15	0.50
TSCS	-5.80	15.08	44.18	44.11	-0.89	15	0.39
CAS	1.60	0.67	7.64	5.52	0.28	15	0.78

*p≤0.10; **p≤0.05; ***p≤0.01

According to the results in Table 2, it is clear that the adjusted means for the genders for the MABC, TSCS and CAS do not differ significantly from the first to the last testing opportunity in any of the different intervention groups (group 1 to 4). With regard to their MABC-total, the motor proficiency of girls in the motor based intervention group (group 1) and in the integrated psycho-motor intervention group (group 3) improved slightly more compared to

that of the boys. In the psychological intervention group (group 2) the girls' motor proficiency decreased, while in the control group (group 4) the boys' motor proficiency improved non-significantly more than that of the girls, from the first to the last testing opportunity. With regard to the TSCS it can be seen that, in the psychological group (group 2) and in the integrated psycho-motor intervention group (group 3), the girls' self-concept improved more than that of the boys from the first to the last testing opportunity. This difference between the genders showed a moderate but significant improvement (p=0.09) in group 2. The self-concept of the girls in groups 1 and 4 on the other hand decreased non-significantly from the first to the last testing opportunity, although it should be kept in mind that the girls in these groups did not receive any psychological intervention. In contrast to this finding, the self-concept of the boys in these groups (group 1 and 4)did improved slightly, however this was not-significant, from the first to the last testing opportunity.

With regard to anxiety (CAS), the results indicate that girls in groups 1 and 2 experienced a slight decrease in anxiety from the first to the last testing opportunity, while boys in these groups showed a slight increase in anxiety during this period. In group 3 both boys and girls showed a slight decrease in anxiety whereas in group 4 both the boys and girls showed an increase in anxiety from the first to the last testing opportunity. Because the girls in group 2 showed a moderate statistically significant improvement in TSCS compared to the boys, the subscales of the TSCS in group 2 were also analyzed by making use of an independent t-test (Table 3).

TABLE 3. **SIGNIFICANCE OF DIFFERENCES BETWEEN BOYS AND GIRLS FOR THE TSCS SUBSCALES IN GROUP 2**

Test	Adjusted Mean Girls	Adjusted Mean Boys	SD-Girls	SD-Boys	t-value	df	p-value
Physical	11.00	3.20	9.67	8.58	1.35	8	0.21
Moral	3.20	0.40	7.79	7.30	0.59	8	0.57
Personal	10.20	4.80	3.03	4.76	2.14	8	0.06*
Family	10.40	7.80	8.08	7.82	0.52	8	0.62
Social	9.80	10.40	7.73	5.13	-0.14	8	0.89
Academic	8.00	3.40	3.16	5.86	1.55	8	0.16

*p≤0.10; **p≤0.05; ***p≤0.01

From this analysis it seemed that the self-concept of the girls improved non-significantly more after the completion of a psychological intervention programme than that of boys in all the subscales, except for the social subscale. The difference between the boys and girls were statistically significant at a moderate level in the personal subscale (p=0.06).

With regard to differences between the three ethnic groups (white, black and coloured), change after intervention was analyzed by making use of a one-way variance of analysis test.

TABLE 4. **SIGNIFICANCE OF DIFFERENCES BETWEEN THE DIFFERENT ETHNIC GROUPS FOR EACH SPECIFIC INTERVENTION GROUP**

Group 1			
MABC			
Test component	**M(1)=-13.28**	**M(2)=-5.63**	**M(3)=-10.17**
White children (1)		0.05**	0.79
Black children (2)	0.05**		0.62
Coloured children (3)	0.79	0.62	
TSCS			
Test component	**M(1)=9.78**	**M(2)=-22.38**	**M(3)=41.33**
White children (1)		0.33	0.65
Black children (2)	0.33		0.20
Coloured children (3)	0.65	0.20	
CAS			
Test component	**M(1)=-1.78**	**M(2)=2.25**	**M(3)=0.00**
White children (1)		0.30	0.91
Black children (2)	0.30		0.86
Coloured children (3)	0.91	0.86	
Group 2			
MABC			
Test component	**M(1)=2.40**	**M(2)=0.50**	**M(3)=-6.50**
White children (1)		0.94	0.42
Black children (2)	0.94		0.57
Coloured children (3)	0.42	0.57	
TSCS			
Test component	**M(1)=47.60**	**M(2)=43.33**	**M(3)=22.50**
White children (1)		0.97	0.51
Black children (2)	0.97		0.62
Coloured children (3)	0.51	0.62	
CAS			
Test component	**M(1)=-2.80**	**M(2)=-3.33**	**M(3)=5.00**
White children (1)		0.99	0.30
Black children (2)	0.99		0.32
Coloured children (3)	0.36	0.32	
Group 3			
MABC			
Test component	**M(1)=-10.75**	**M(2)=-7.50**	**M(3)=-7.50**
White children (1)		0.82	0.82

Black children (2)	0.82		1.00
Coloured children (3)	0.82	1.00	
TSCS			
Test component	**M(1)=36.50**	**M(2)=46.00**	**M(3)=64.00**
White children (1)		0.94	0.61
Black children (2)	0.94		0.80
Coloured children (3)	0.61	0.80	
CAS			
Test component	**M(1)=-1.50**	**M(2)=-0.50**	**M(3)=-0.14**
White children (1)		0.98	0.97
Black children (2)	0.98		1.00
Coloured children (3)	0.97	1.00	
Group 4			
MABC			
Test component	**M(1)=-7.31**	**M(2)=-5.50**	**M(3)=-5.20**
White children (1)		0.84	0.75
Black children (2)	0.84		1.00
Coloured children (3)	0.75	1.00	
TSCS			
Test component	**M(1)=19.75**	**M(2)=-10.50**	**M(3)=7.20**
White children (1)		0.62	0.90
Black children (2)	0.62		0.84
Coloured children (3)	0.90	0.84	
CAS			
Test component	**M(1)=-1.63**	**M(2)=3.50**	**M(3)=3.00**
White children (1)		0.45	0.44
Black children (2)	0.45		0.99
Coloured children (3)	0.44	0.99	

*p≤0.10; **p≤0.05; ***p≤0.01

The results in Table 4 revealed a statistically significant difference with regard to the MABC-total between the white and the black children in group 1 (p=0.05), indicating that white children's motor proficiency improved significantly more from the first to the last testing opportunity than in the case of the black children after completion of a motor based intervention programme.

No significant differences could be documented between any of the ethnic groups in any of the intervention groups with regard to their MABC, TSCS and CAS. However, from the results in Table 4 it does seem that the MABC-total of white children in groups 1, 3 and 4 improved most, although not significantly. The motor proficiency of the white children did ,therefore, improve most after the motor based intervention as well as integrated psycho-motor intervention programme. They were also the ethnic group within the control group (who did

not receive any intervention) whose motor proficiency improved the most. In contrast, group 2 was the ethnic group whose motor proficiency decreased most from the first to the last testing opportunity. Though the children in group 2 received only psychological intervention, the coloured children showed improvement in their motor proficiency from the first to the last testing opportunity. In group 1 the black children showed the least improvement after the motor based intervention programme, while the coloured children showed the second most improvement. The black and coloured children in groups 3 and 4 showed the same amount of improvement from the first to the last testing opportunity. With regard to the TSCS it seemed that the self-concept of the children in the groups that received psychological intervention had improved. However, not one ethnic group could be identified, that in general, improved more than the others. One interesting finding was, however, that the black girls, who did not receive psychological intervention, showed a decrease in their self-concept score from the first to the last testing opportunity. With regard to the CAS, it was found that the anxiety of white children in groups 1, 3 and 4 decreased most from the first to the last testing opportunity. In group 2 the black children showed the largest decrease, while the coloured children in this group showed an increase in anxiety. In groups 1 and 4 the white children were the only group that showed a decrease in anxiety, while, the black children in these groups showed an increase in anxiety. The coloured children in group 1 an increase in anxiety but in group 4 their anxiety score stayed the same. It seems that the only group in which all three the ethnic groups showed a decrease in anxiety was group 3 (integrated psycho-motor intervention). Because the white children in group 1 had a significantly more marked improvement in their MABC-total than the black children, a one-way analysis of variance was conducted for the subscales of the MABC in this group (Table 5).

TABLE 5. **SIGNIFICANCE OF DIFFERENCES BETWEEN THE DIFFERENT ETHNIC GROUPS FOR THE MABC SUBSCALES IN GROUP 1**

Manual Dexterity Skills (MD)			
Test component	**M(1)=-5.56**	**M(2)=-3.94**	**M(3)=-3.83**
White children (1)		0.72	0.87
Black children (2)	0.72		1.00
Coloured children (3)	0.87	1.00	
Ball Skills (BS)			
Test component	**M(1)=-4.33**	**M(2)=-1.88**	**M(3)=-2.33**
White children (1)		0.18	0.63
Black children (2)	0.18		0.98
Coloured children (3)	0.63	0.98	
Balance Skills (BAS)			
Test component	**M(1)=-3.39**	**M(2)=0.19**	**M(3)=-4.00**
White children (1)		0.10	0.97
Black children (2)	0.10		0.28
Coloured children (3)	0.97	0.28	

*p≤0.10; **p≤0.05; ***p≤0.01

The results of this analysis (Table 5) displayed no significant differences between the different ethnic groups with regard to the MABC subscales. Table 5 does, however, show that the white children showed the most improvement for the MD and BS subscales. On the other hand, it was the coloured children in the BAS subscale who showed the largest increase in balance proficiency, while the black children showed a slight decrease in their balance proficiency from the first to the last testing opportunity.

DISCUSSION

The aim of this study was to determine the effect of gender and ethnic groups on the success of a purely motor based intervention, integrated psycho-motor intervention and psychological intervention for children 7–9 years of age diagnosed with DCD.

In general it can be concluded that no significant differences exist between the genders after participation in the different intervention programmes. This supports findings by Emmanouel *et al.* (1992) and Goodway and Rudisill (1996) who also reported no differences between genders at ages 10 and 4 respectively after participation in a motor intervention programme. The only statistically significant difference found between the two genders was in group 2 (who followed the psychological intervention programme) where the self-concept of girls moderately improved than the self-concept of boys from the first to the last testing session. The same tendency, although not significant, was also found in group 3 (who received psychological and motor intervention) where the girls again showed a more marked improvement in self-concept compared to the boys. Therefore it, seems that, in general, the girls in this study react more positively on a psychological intervention programme than the boys. With regard to the subscales of the TSCS it was found that the girls showed the most improvement from the first to the last testing opportunity in all the subscales, except for the social subscale.

When the results regarding anxiety of the children are taken into consideration, it seems that the girls in the motor based intervention group, in the integrated psycho-motor intervention group as well as in the self-concept intervention group showed a general decrease in anxiety from the first to the last testing opportunity, whereas the boys in the motor based intervention group and psychological intervention groups showed a general increase in anxiety. The boys in the integrated psycho-motor intervention group were the only ones that showed a decrease in anxiety. However, these tendencies were not significant. The increase in anxiety among the boys in the motor based intervention group could be due to the fact that they realized during the motor intervention period, that they experienced certain problems, which possibly could have led to a raise in anxiety. The fact that this same tendency was evident in the psychological group is, however, difficult to explain. In general, the boys showed higher anxiety compared to the girls, which is contradictory to the current literature (Ohannesian *et al.*, 1999; Rose *et al.*, 1999), which states that girls with motor problems displayed higher anxiety than boys.

With regard to the influence of ethnicity on improvement, it seemed that the motor proficiency of the white children in group 1 improved significantly more than the motor proficiency of the black children in the same group after completion of the motor intervention programme. A possible reason for this could be the fact that some of the black children who participated in the study, and who are in a dual medium school (Afrikaans and English) could, however, not

speak or understand English or Afrikaans fluently. Hence, they could have struggled to understand and follow all the instructions enabling them to participate in the intervention programme to their full potential. A further explanation could be the fact, as explained by Peens *et al.* (submitted for publication), that neuro-motor problems could influence the effect of an intervention programme negatively. It could therefore be possible that some of the black children in this study had certain underlying neuro-motor problems that could have negatively influenced the effect of the intervention programmes, although this conclusion is only speculative. A further possibility could be that the black children do not have the same opportunities and exposure for motor development as the white children might have. Further analysis of the subscales of the MABC, however, showed no differences between the ethnic groups, which could explain the differences found. However, no literature could be traced that indicates that adaptations should be made to motor intervention programmes based on specific ethnic considerations.

With regard to the total self-concept of the different race groups, it seemed that the self-concept of coloured children in groups 1 and 3 improved most, while on the other hand the self-concept of white children in groups 2 and 4 improved the most from the first to the last testing opportunity. However, none of the above-mentioned differences were significant. As for anxiety, it was found that in groups 1 and 4 it was only the white children's anxiety that decreased. In group 3 the anxiety of the white children decreased most of all the ethnic groups while in group 2 it was the black children whose anxiety decreased most. These differences with regard to anxiety were not statistically significant. It was only in group 3 (psycho-motor programme) that the anxiety of all three the ethnic groups decreased. It therefore seemed necessary for children to partake in both a psychological and motor based intervention programme in order to decrease the anxiety that is associated with their motor problems and low self-concept.

In conclusion, it could be stated that ethnicity and gender did not influence the effect of the different intervention programmes that the children were allocated to. This statement is based on the fact that the motor proficiency of the children (of both genders and different ethnic groups) improved after participation in the motor based intervention as well as the integrated psycho-motor intervention programme. In addition, the children that participated in the psychological and integrated psycho-motor intervention programme showed similar improvement in their self-concept. The only exception found with regard to anxiety has been discussed with regard to gender and ethnic groups.

Although two moderate statistically significant differences were found in the results of this study, they are deemed not large enough to justify the use of different intervention programmes for the two genders and the different ethnic groups.

The high number of dropouts in the study did cause certain limitations. Firstly, if all the participants could have been in the study from the first to the last testing opportunity, and thereby could have represented all genders and ethnic groups in each intervention group, more relevant in-depth analyses could have been done to distinguish between gender and ethnic group in each intervention group. A further confounding factor was the fact that all the children, although they were in dual medium schools, could not speak and understand the medium of instruction fluently. A final limiting factor was that the control group in this study

was not totally inactive during the intervention period. Limitations of this nature should thus be addressed in future studies of this nature.

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