DOI: https://doi.org/10.67203/jhpesls.2023.xo2q3e11

Journal of Health, Physical Education, Sports and Leisure Studies, Vol. 8, No. 1, Sept., 2023

EFFECT OF CORE-STABILITY TRAINING ON PHYSICAL WORK CAPACITY OF PUPILS WITH INTELLECTUAL DISABILITY IN THE SCHOOL FOR THE HANDICAPPED OYO, OYO STATE

BY

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Abstract

This study investigated the effect of core stability training on physical work capacity of pupils with special needs in the school for the handicapped Oyo, Oyo State with seven hypotheses. Simple randomised pre-test post-test control experimental research design of 2×2×2 factorial matrix was adopted. Purposive sampling technique was used to get the 52 participants of which (n=32) pupils with special needs (ID) (n=17) were males and (n=15) females were assigned into experimental and (=20) normal pupils of which (=11) males and (n=9) females were assigned into control groups, while intervention lasted for 8 weeks. Age and gender were examined as the moderating effects, while control group received nutrition as placebo. Fore-arm prone plank, bird-dog, side plank, bicycle crunches and leg raises were used as core stability training. Instruments used were Hand Dynamometer, stop watch, mats, stadiometer, and portable bathroom weighing scale and floor. Data were analysed using descriptive statistics and Analysis of covariance (ANCOVA) at 0.05 level of significance. Treatment group had the highest mean score (mean=18.340) followed by control group with (mean=15.055) on muscular strength, while controlled group had the highest mean score (mean=6.598) followed by treatment group with (mean=5.45) on balance. There were very large significant main effects on muscular strength ms ($F = 39.129$, $p<.05$, $\eta^2=44.4\%$); balance ($F = 6.811$, $p<.05$, $\eta^2=12.2\%$); interaction effect of treatment and age on balance ($F = 5.812$, $p<.05$, $\eta^2=11.0\%$) and interaction effect between treatment, age and gender on balance ($F= 4.073$, $p<.05$, $\eta^2=8.7\%$). There were no significant main effects of gender on muscular strength; age on balance and gender on balance; interaction effect of treatment and age on muscular strength ($F = 0.287$, $p>.05$, $\eta^2=0.6\%$); interaction effect between treatment, age and gender on muscular strength ($F= 0.137$, $p>.05$, $\eta^2=0.3\%$); interaction effect of age and gender on balance ($F= 0.501$, $p>.05$, $\eta^2=1.1\%$); interaction effect of treatment and gender on balance ($F = .250$, $p>.05$, $\eta^2=0.5\%$). It was recommended thatCore stability training should as well be prescribed to people with special needs (intellectual disability) as home

activity to increase level of participation in societies based children or people with cerebral palsy or contractures.

KEYWORDS: Core stability training, Physical work capacity, Pupils with special needs.

Introduction

Children with special needs (Intellectual disability) exhibit numerous impairments in different domains of functioning. Alongside impairments in physical capacity, social and adaptive behaviour, they also report lower levels of cognition at all stages of life. If a child's muscles are weak or if one muscle is weaker than the other, or if the messages to the muscles tell them to work too hard (high tone) or not hard enough (low tone) then it is possible that the child will have poor core stability and the child's other movement skills will be affected. An intellectual disability or learning disability is a neurological disorder. In simple term, a learning intellectual disability results from a difference in the way a person's brain is wired or form. According to Gerard, and Steve, (2014) stated that children with special needs or intellectual disability are as smart as or smarter than their peers. But they majorly have difficulty in movement, reading, writing, spelling, and reasoning, recalling, and or organizing information if left to figure things out themselves or if taught in conventional ways. An intellectual disability can't be cured or fixed, it is a lifelong issue. With the right support and intervention, however, children with special needs (intellectual disability), in their stages of being can be improved, or succeed in schools and go on to successful, often distinguished careers later in life, (Ahmadi, &Daneshmandi, 2013).

Physical work capacity is the ability to perform maximal physical work. Physical work capacity in the typically grown and individuals with special needs is of necessity in life not only in carrying the body weight in an upright posture, but also to do other activities that are essential in day-to-day life. Modern researches such as Judith, Kitty and Freedman, (2017) posits that, core stability training can help pupils with special needs (intellectual disability) achieve their physical capacity by engaging in the core stability exercises that strengthen their core muscles in a well-structured, planned and repetitive supervised training programmes. As it is a function of the intensity and duration of work, each individual has many different capacities such as anaerobic, aerobic and endurance capacity, each with its own limiting factors (Dekart& Kelsey, 2014).

Core stability training is very vital in enhancing body balance and postural control in movements such as landing and contact, (Malátová, Rokytová. & Stumbauer, 2013). Core muscles such as the transverse abdominis, multifidus, diaphragm, and pelvic floor muscles are thought to contribute mainly to the stability of the spine (physio-pedia., 2021). That transverse abdominis get contracted first to ensure stiffness as a feed forward function during upper limb activities and standing tasks involving sudden perturbation. The other core muscles (i.e., multifidus, diaphragm, and pelvic floor muscles) are supposed to perform the similar functions to transverse abdominis. Physiologically, these four core muscles contract first to increase stability of the trunk during extremity

exercises and have been considered to help prevent injuries in one's life, (Shih-Lin, Harumi, Saya, Mana& Makoto (2018).

Postural stability problems usually exit with special needs children, especially those with intellectual disability, Down syndrome, communication and behavioural disorders. Muscle weakness may be responsible for balance problems in children with intellectual disability that reduces their balance in standing and increases their risk, of falling, (Lee &Gray, 2016).

The preservation of muscle strength at a satisfactory level is necessary for the activities of life; same is required for these set of people.

Preliminary observation by the researcher noticed that, little research is available on the physical capacity and intervention programmes among pupils with special needs (intellectual disability) in Nigeria, particularly concerning children with intellectual disability in Oyo East Local Government. This therefore, drew the attention of the researcher to the need to conduct core stability training on physical work capacities of the pupils with special needs (intellectual disability) in Oyo East Local Government.

The result of this investigation might be vital point of reference needed for any planning training exercise especially for improvement of physical work capacity of children with special needs. Thus, the relevance of incorporating core stability training programme on physical work capacity of pupils with special needs during physical education practical sessions by physical education teachers and exercise physiologists, if structured and planned well, can improve not only health related but also performance related skills.

Hypotheses

The following hypotheses were tested:

1. There will be no significant main effect of treatment (Core stability training and Nutrition education) on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State.
2. There will be no significant main effect of age on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State.
3. There is no significant main effect of gender on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State.
4. There is no significant interaction effect of treatment and age on muscular strength and of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo State.
5. There is no significant interaction effect of treatment and gender on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo State.
6. There is no significant interaction effect of age and gender on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped

Oyo State.

7. There is no significant interaction effect three-way interaction effect between treatments (experimental and control group), age and gender on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo State.

Methodology

A randomised pre-test-post-test control group experimental research design was used for the study. The participants were divided into two groups, that is, 1 experimental group that received the intervention (core stability training) while group 2, the control group received Nutritional Education. A 2×2×2 factorial matrix was used for analytical part of the study. The design systematically represented thus:

Experimental Group-	T1	X1	T3
Control Group-	T2	X2	T4

- T1 and T2 were pre-test observation for both experimental and control groups
- X1 was the actual intervention (core stability training)
- X2 was the nutritional education (control group)
- T3 represented post-test observation for the experimental group, while
- T4 was the post-test observation for nutritional education.

This design gave the investigator an ample opportunity to make comparison between the pre-test and post-test readings of the participants' improvement in physical work capacity.

Table 1: 2x2x2 factorial matrix

Intervention (Group)	Age	Gender
Core stability training (Experimental group)	7 – 19	Male
		Female
	20 – 32	Male
		Female
Nutrition Education (Control Group)	7 – 19	Male
		Female
	20 – 32	Male
		Female

The population for this study comprised of all the pupils with Special Needs, (Intellectual disability) in the School for the Handicapped Oyo, Oyo State. This included pupils in primaries 2, 3 and 4. The sample size for this study was fifty two (52) pupils with Special Needs, (Intellectual disability) in primaries 2, 3 and 4 in the School for the Handicapped Oyo, Oyo State. Purposive sampling technique was used as the participants were already in stratum of which 21 were in primary 2, 22 were in primary 3 and 9 were in primary 4 respectively; therefore randomization was used to assign the participants into both treatment and control group accordingly. The control group was engaged in nutrition

education. While treatment group, were engaged in core stability exercises. Total enumeration was used to accommodate all pupils in selected classes to be participants. However, volunteerism also be adopted.

The under listed instruments were used for the collection of data:

1. **Bathroom weighing scale:** Hana portable weight measuring scale model no (BR 9011) with the capacity of 120 kilogramme (kg),was used to obtain the immediate body weight of the participants.
2. **Stop watch:** was used for timing.
3. **mats:** were used for core muscles' strength training.
4. **Flat non-slip surface and mat:** was used for floor core stability training.
5. **Stadiometer: was** used in measuring the heights of the participants.
6. **Hand-grip Dynamometer:** was used to test for maximum isometric strength of the upper limbs.
7. **Single Leg stand Test:** was used to test the stability of the participants.
8. **5 minutes step test:** was used to measure physical work capacity of the participants.

Completed data was collected, collated and analysed using both descriptive and inferential statistics. Descriptive statistics of frequency counts, percentages and chart were used for the analysis of demographic data and research questions while Analysis of Variance (ANCOVA) was used to test all the hypotheses at $P<0.05$, level of significance.

Results

There is a significant main effect of Treatment on muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State ($F = 39.129$, $p<.05$, $\eta^2=.444$). Therefore the hypothesis was rejected; this implied that the treatment was effective in measuring the muscular strength of pupils with special needs in the school for the Handicapped Oyo.

Table 2: Estimated marginal means of treatment on muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State

Treatment Groups	Mean ($\bar{x}$)	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experimental	18.340	0.311	17.716	18.965
Control	15.055	0.400	14.251	15.860

Table 2: showed the estimated marginal means of treatment on muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State. It was revealed that after controlling for the effect on muscular strength, pupils in the core stability training group (had the highest mean score (mean = 18.340), followed by those in the nutrition education (mean= 15.055). This implied that the core stability training was potent in relating muscular strength of pupils with special needs in the study.

There is no significant main effect of age on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State. Therefore the hypothesis was accepted; this implied that age had no significant effect on muscular strength of pupils with special needs in the study.

Table 3: Estimated marginal means of age on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo

Age	Mean ($\bar{x}$)	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
7-19 years	16.788	.383	16.019	17.557
20-32 years	17.789	.630	16.522	19.056

Table 3. Showed the estimated marginal means of age on muscular strength of pupils with special needs (intellectual disability) in the study.

There is no significant main effect of gender on muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State. Therefore the hypothesis was accepted; this implied that gender had no significant effect in relating muscular strength of pupils with special needs in the study.

Table 4: Estimated marginal means of Gender on muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo

Gender	Mean ($\bar{x}$)	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	16.768	.431	15.902	17.634
Female	17.437	.466	16.501	18.374

Table 4. Showed the estimated marginal means of gender on muscular strength of pupils with special needs (intellectual disability) in the study.

There is no significant interaction effect of treatment and age on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo ($F = 0.287$, $p>.05$, $\eta^2=.006$). Therefore the hypothesis was accepted; this implied that treatment and age had no significant effect on muscular strength of pupils with special needs.

Table 5: Estimated marginal means of treatment and age on muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo

Treatment	Age	Mean ($\bar{x}$)	Std. Error
Experimental group	7-19 years	18.570	0.385
	20-32 years	17.886	0.541
Control group	7-19 years	15.100	0.441
	20-32 years	15.089	0.995

Table 5. Showed the estimated marginal means of treatment and age on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State.

There is no significant interaction effect of treatment and gender on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo ($F = .006$, $p>.05$, $\eta^2=.001$). Therefore the hypothesis was accepted; this implied that treatment and gender had no significant effect on muscular strength of pupils with special needs in the study.

Table 6: Estimated marginal means of treatment and gender on muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State

Treatment	Gender	Mean ($\bar{x}$)	Std. Error
Experimental group	Male	18.137	.473
	Female	18.538	.451
Control group	Male	14.936	.560
	Female	15.256	.579

Table 6. Showed the estimated marginal means of treatment and gender on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State.

There is no significant interaction effect of age and gender on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo ($F= 0.358$, $p>.05$, $\eta^2=.008$). Therefore the hypothesis was accepted; this implied that age and gender had no significant effect in relating muscular strength of pupils with special needs.

Table 7: Estimated marginal means of age and gender on muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo

Age	Gender	Mean ($\bar{x}$)	Std. Error
7-19 years	Male	16.925	.502
	Female	17.389	.595
20-32 years	Male	16.257	.929
	Female	17.569	.817

Table 7. Showed the estimated marginal means of age and gender on Muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo.

There is no significant interaction effect between treatment, age and gender on muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo ($F= 0.137$, $p>.05$, $\eta^2=.003$). Therefore the hypothesis was accepted; this implied that the interaction between treatment, age and gender had no effect on

muscular strength of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo.

There is a significant main effect of Treatment on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State ($F = 6.811$, $p<.05$, $\eta^2=.122$). Therefore the hypothesis is rejected; this implied that the treatment was effective in measuring the balance of pupils with special needs in the school for the Handicapped Oyo.

Table 8: Estimated marginal means of treatment on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State

Treatment Groups	Mean ($\bar{x}$)	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Core stability training	5.845	.153	5.538	6.151
Nutrition education	6.598	.206	6.184	7.013

Table 8. Showed the estimated marginal means of treatment on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State. It was revealed that after controlling for the effect on balance, pupils in the nutrition education group (had the highest mean score (mean = 6.598), followed by those in the core stability training group (mean= 5.845). This implies that the nutritional education was potent in relating balance of pupils with special needs in the study.

There is no significant main effect of age on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State. Therefore the hypothesis was accepted; this implied that age has no significant effect on balance of pupils with special needs in the study.

Table 9: Estimated marginal means of age on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo

Age	Mean ($\bar{x}$)	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
7-19 years	6.220	.130	5.958	6.482
20-32 years	5.923	.205	5.511	6.335

Table 9. Showed the estimated marginal means of age on balance of pupils with special needs (intellectual disability) in the study.

There is no significant main effect of gender on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State. Therefore the hypothesis was accepted; this implied that gender had no significant effect in relating balance of pupils with special needs in the study.

Table 10: Estimated marginal means of gender on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo

Gender	Mean ($\bar{x}$)	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	6.044	.153	5.736	6.352
Female	6.241	.166	5.907	6.574

Table 10. Showed the estimated marginal means of gender on balance of pupils with special needs (intellectual disability) in the study.

There is a significant interaction effect of treatment and age on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo ($F = 5.812$, $p<.05$, $\eta^2=.110$). Therefore the hypothesis was rejected; this implied that treatment and age had an interaction effect on balance of pupils with special needs.

Table 11: Estimated marginal means of treatment and age on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo

Treatment	Age	Mean ($\bar{x}$)	Std. Error
Experimental group	7-19 years	5.803	.182
	20-32 years	5.986	.217
Control group	7-19 years	6.720	.204
	20-32 years	5.628	.459

Table 11. Showed the estimated marginal means of treatment and age on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State.

There is no significant interaction effect of treatment and gender on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo ($F = .250$, $p>.05$, $\eta^2=.005$). Therefore the hypothesis was accepted; this implied that the interaction between treatment and gender had no effect on balance of pupils with special needs in the study.

Table 12: Estimated marginal means of treatment and gender on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo.

Treatment	Gender	Mean ($\bar{x}$)	Std. Error
Experimental group	Male	5.850	.189
	Female	5.844	.240
Control group	Male	6.497	.270
	Female	6.714	.281

Table 12. Showed the estimated marginal means of treatment and gender on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo, Oyo State.

There is no significant interaction effect of age and gender on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo (F= 0.501, p>.05, η^2=.011). Therefore the hypothesis was accepted; this implied that the interaction between age and gender had no effect in relating balance of pupils with special needs.

Table 13: Estimated marginal means of age and gender on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo

Age	Gender	Mean ($\bar{x}$)	Std. Error
7-19 years	Male	6.168	.177
	Female	6.288	.202
20-32 years	Male	5.675	.302
	Female	6.143	.283

Table 13. Showed the estimated marginal means of age and gender on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo.

There is a significant interaction effect between treatment, age and gender on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo (F= 4.073, p<.05, η^2=.087). Therefore the hypothesis was rejected; this implied that the interaction between treatment, age and gender had an effect on balance of pupils with special needs (intellectual disability) in the school for the Handicapped Oyo.

Discussion

There were significant main effects on muscular strength MS (F = 39.129, p<.05, η^2=.444); balance (F = 6.811, p<.05, η^2=.122); interaction effect of treatment and age on balance (F = 5.812, p<.05, η^2=.110) and interaction effect between treatment, age and gender on balance (F= 4.073, p<.05, η^2=.087).

Also there were no significant main effects of gender on muscular strength; age on balance and gender on balance; interaction effect on treatment and age on muscular strength (F = 0.287, p>.05, η^2=.006); interaction effect of treatment and gender on muscular strength (F = .006, p>.05, η^2=.001); interaction effect of age and gender on muscular strength (F= 0.358, p>.05, η^2=.008); interaction effect between treatment, age and gender on muscular strength (F= 0.137, p>.05, η^2=.003); interaction effect of treatment and gender on balance (F = .250, p>.05, η^2=.005).

This study therefore, showed that the difference in muscular strength and balance between the experimental and control groups were statistically significant. Thus, there were very large significance effects sizes of 44.4% core stability training on muscular strength; 12.2% of core stability training on balance; 11.0% of core stability training and age on balance and 8.7% of core stability training, age and gender on balance respectively.

Conclusions

With regards to the findings of the study, the following conclusions were drawn:

Core stability training improves the physical work capacity following an 8-week intervention.

Core stability training could be used as an adjunct in special approaches on physically work incapacitated intellectually disabled or learners with special needs in order to improve their physical work capacity.

Recommendations

Based on the outcome of this study, the following recommendations are made:

1. Core stability training should be incorporated into the physical education classes or practical sessions in schools for handicapped (intellectual disabled) such that its usefulness and effectiveness in the improvement of physical work capacity of learners with special needs (intellectual disability), especially among the cerebral palsy learners.

2. Core stability training should as well be prescribed to people with special needs (intellectual disability) as home activity to increase level of participation in societies based children or people with cerebral palsy or contractures. Thus, this will bridge the gap that might be created due to school enrolment.

3. Professionals in exercise physiology should as a matter of fact, integrate core stability training in training and create more awareness for parents or relations of people with special needs (intellectual disability) or cerebral palsy to endeavour to go to fitness centres with them as equipment used for the training of such condition are readily available and affordable.

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