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Research article

The effect of a motor intervention programme for learners identified with moderate to severe intellectual disabilities

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ABSTRACT

Background: Intellectual disabilities (ID) cause problems in intellectual and adaptive functioning which negatively affect motor proficiency levels.
Aim: This study investigates the impact of a motor intervention programme on the motor proficiency levels of learners identified with moderate to severe ID.
Method: A quasi-experimental design was used to recruit participants which included 46 learners aged 15–17 years, identified with moderate to severe ID, selected from a South African special school. Participants were randomly divided into two groups. The 15 experimental learners received a 30-minute motor intervention programme, 3 times a week for a period of 6 weeks, whereas the 23 control learners continued with their normal physical education classes. Groups were assessed using the Bruininks-Oseretsky Test of Motor Proficiency, second edition (BOT-2) Brief Form.
Results: The motor intervention programme significantly improved the total scores ($p = 0.0380$) and the overall motor proficiency levels ($p = 0.0447$) of the experimental group.
Conclusions: This study reveals evidence that a motor intervention programme can be used as an effective means to improve the motor proficiency levels of learners with moderate to severe ID.
Implications: A motor intervention should be implemented as soon as possible to enhance the motor proficiency levels of these learners.

1. Introduction

Intellectual disability (ID) is defined as having a reduced intelligence or cerebral functioning, and affected individuals lack the necessary skills to perform tasks of daily living (American Psychiatric Association [APA], 2013; Pise et al., 2018). Learners with ID find it difficult to perform practical daily activities such as dressing, grooming, cooking food, and using the restroom, and to function appropriately in social situations as their ability to learn and adapt to environmental factors is reduced (Pise et al., 2018). Furthermore, learners with ID have higher levels of perceptual, vestibular, neurological, skeletal, emotional and behavioural problems compared to learners with typical intelligence (Elmasry et al., 2020). The onset of ID presents after birth up to the age of 18 years old (APA, 2013; American Association on Intellectual Developmental Disabilities [AAIDD], 2018; Schalock et al., 2019), and it has been suggested that the prevalence of ID is increasing (Didehdar and Kharazinejad, 2019).

Didehdar and Kharazinejad (2019) indicated that ID affects approximately 170 million individuals worldwide and this number increases on average by 200 thousand every year. The diagnosis of ID depends on deficits present in three areas of adaptive skills, including communication and language skills, practical daily living skills and social interaction skills (APA, 2013). Depending on how well learners can perform in these aforementioned areas (Buntinx and Schalock, 2010; APA, 2013), ID can be differentiated into four categories, namely mild ID, moderate ID, severe ID and profound ID (APA, 2013; Roth et al., 2017). The focus of this investigation will be specifically on the category of moderate to severe ID. Moderate ID affects approximately 10% of the population whereas severe ID comprises only 4% of the population diagnosed with ID (Roth et al., 2017). It has been proposed that learners with ID have deficits in motor proficiency skills (Westendorp et al., 2011; Rintala and Loovis, 2013; Jeoung, 2018).

Motor proficiency skills are important to ensure mastery in physical skills and motor patterns which enable learners to participate

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successfully in activities such as walking home or to the classroom, playing recreational games with others or writing with a pencil and cutting with scissors (Khodaverdi et al., 2013). Inadequate motor proficiency skills are a common occurrence in learners with ID, as ID is a disorder that causes deficiencies in cerebral functioning which influences the intellectual functioning as well as the motor proficiency (Giagazoglou et al., 2012; Top, 2015). This is evident from a research study conducted in the Netherlands that determined that learners with ID exhibit delays in motor proficiency skills such as manual dexterity, balancing and ball skills (Vuijk et al., 2010). Also, the results of the study demonstrated that motor proficiency skills and cognitive functioning are interrelated in learners with ID (Vuijk et al., 2010). Furthermore, researchers indicated that learners with ID take a longer time to acquire motor proficiency skills (Pise et al., 2018). Delays in motor proficiency skills have a negative consequence on learners' participation in recreational sporting activities and daily outdoor activities, consequently leading to less active lifestyles, lower physical activity levels and inadequate fitness levels (Giagazoglou et al., 2012; Aertssen et al., 2018).

In a study conducted in Korea, it was discovered that 25% of learners with ID were overweight or obese (Choi et al., 2012). Thus, it is possible to argue that deficiencies in motor proficiency skills may result in learners with ID having a poorer involvement in areas such as play, homework activities and performance in daily activities (Jahani et al., 2016). Lower levels of participation in these areas as a result of low motor proficiency levels may contribute to physical inactivity and result in high levels of obesity. Researchers therefore pointed out that it is important to address the high levels of physical inactivity in learners with ID and decrease the rate of obesity by means of a motor intervention programme (Bishop and Pangelinan, 2018; Maïano et al., 2019).

A motor intervention programme involves training the fundamental movement skills (locomotor, manipulation and stability) which allow learners with ID to develop more complex motor patterns necessary to play games, participate in dynamic playing, perform in recreational and competitive sporting activities, and do gymnastics (Ashori et al., 2018). A low number of studies have examined the effects of using a motor intervention programme for learners with ID. A study conducted in the Netherlands inspected the impact of a functional motor intervention programme for learners with several disabilities and profound ID. The study revealed that this intervention significantly enhanced the basic motor skills to perform daily living tasks (sitting, standing and walking) of the experimental group, whereas the motor skills of the control group remained the same (Van der Putten, Vlaskamp, Reynders and Nakken, 2005). In Australia, a study investigated the practicality of a motor intervention programme for learners with moderate learning problems. Findings indicated that the motor intervention programme significantly improved the writing speed and the gross motor coordination skills of these learners (Boyle, 2007). The results of an Iranian study focusing on the effect of a motor therapy intervention programme for learners with ID indicated that there were significant improvements in the gross and fine motor skills and bilateral coordination abilities of these learners (Ashori et al., 2018).

Other studies focused on improving the motor proficiency skills of learners with ID using a specific intervention approach. A study investigated the effect of a sensory integration intervention approach on the balancing skills of learners with moderate ID and Down syndrome. The study found that the sensory intervention approach significantly improved the static and dynamic balancing skills of these learners (Didehdar and Kharazinejad, 2019). A study conducted in Greece by Giagazoglou et al. (2012) examined the impact of a hippotherapy (horse riding) intervention approach on lower-body strength and balancing skills for children with moderate ID. The results revealed that the intervention approach significantly improved these children's ability to squat more effectively and be able to balance more efficiently on a single leg.

The aforementioned studies suggest that intervention programmes are beneficial for learners with ID to improve their motor proficiency skills and aid them in becoming more physically active. However, considering the beneficial advantages that intervention programmes may offer learners with ID, findings are still limited (Van der Putten et al., 2005; Ashori et al., 2018), and more research is needed concerning learners with different ID levels. Furthermore, no study could be found which focused on learners with moderate to severe ID (IQ 20–55) using a motor intervention programme in South Africa. Surprisingly, most of the previous research done was on borderline to moderate ID learners. The lack of information pertaining to the use of a motor intervention programme for learners with moderate to severe ID, most certainly requires urgent attention. Therefore, the purpose of this study was to examine the effect of a motor intervention programme on the motor proficiency levels of learners identified with moderate to severe ID.

2. Material and methods

2.1. Study design

This study made use of a pre-test, intervention, and blinded post-test that were applied as an empirical study. Quantitative data were collected by the primary researcher (a movement specialist) regarding the motor proficiency levels of learners with moderate to severe ID. A blinded post-test was conducted by occupational therapists which took place after the motor intervention programme had been presented by the primary researcher to learners identified with moderate to severe ID.

2.2. Participants

Participants included learners enrolled in a school for special needs, located in the Mangaung metropolitan area, Free State province of South Africa. Learners had been diagnosed with moderate ID or severe ID with an intelligence quotient of $\leq$70 by a state professional (psychologist) or medical doctor (either private or state-employed). Thereafter, due to the aforementioned diagnoses, learners were referred from mainstream schools by the Free State Department of Education (DOE). Thus, learners were admitted into the school catering for learners with moderate ID, severe ID, profound ID, low-functioning autism, cerebral palsy or Down syndrome as per DOE recommendation. The school identified learners with moderate to severe ID with an IQ range of 20 up to 55. Accordingly, 120 learners met the inclusion criteria of this study, of whom 46 agreed to participate (response rate of 38.3%) in the study.

The following exclusions were applied. Firstly, learners that were not in the age category of 15–17 years. Secondly, learners who had been diagnosed by medical physicians with having any related health conditions (cardiovascular disease or neurological dysfunction) or any physical disabilities (bone disorder, amputee, or paraplegic). Thirdly, learners were excluded when parental consent was not provided or learners did not provide assent. Lastly, learners that were absent for more than 30–40% during the motor intervention programme were excluded. Furthermore, learners were randomly divided into a control group and an experimental group. Randomisation was done according to gender ratios between the experimental group and the control group. Furthermore, the researcher used a simple random sampling method which involved drawing random numbers from a computerised random number generator. Table 1 shows the frequency distribution of learners in terms of total group, experimental group and the control group.

Table 1. Experimental and control groups.

	Control Group	Experimental Group	Total Group
Total Group	23	15	38
Boys	14	10	24
Girls	9	5	14
Median	17	17	16.8
Minimum Age	15.6	15.7	15.6
Maximum Age	17.6	17.7	17.6

Initially, the experimental group consisted of 23 learners (8 girls and 15 boys) with a median age of 16.8 years and the control group consisted of 23 learners (9 girls and 14 boys) with a median age of 17 years. The experimental group age range was 15.7–17.7 years, whereas the control group age range was 15.6–17.6 years. However, 8 learners of the experimental group met the fourth exclusion and thus had to be excluded, as they had either missed more than 40% of the intervention or did not attend. Reasons for the high dropout of these learners were ascribed to illness or being absent from school. Covid-19 restrictions also caused learners not attend school and further added to the high dropout rate. Thus, the final study sample consisted of a control group of 23 learners (9 girls and 14 boys) and an experimental group of 15 learners (5 girls and 10 boys). The median age of learners was 17.0 years with a minimum age of 15.7 years, and a maximum age of 17.7 years.

2.3. Procedure

Initially, learners' motor proficiency levels were assessed by the primary researcher using the BOT-2 Brief Form. Testing was conducted for a period of two weeks during physical education and sports periods to ensure learners did not miss any prescribed academic classes. The primary researcher tested each learner individually in the school hall. Testing only commenced after learners received their food which was provided daily at nine o'clock as part of the schools' national nutritional programme. Learners were tested individually by the researcher. Thereafter, the primary researcher divided the experimental group according to their respective classrooms into two groups, comprising of 11 learners and 12 learners. Every session of the motor intervention programme was offered at the same time of the day by the primary researcher after learners had eaten, to ensure that their energy and concentration levels were adequate. The experimental group received the 6-week motor intervention programme (see Appendix A). The 6-week motor intervention programme was combined with various fundamental movements, such as locomotor-, manipulation-, as well as stability skills which aimed to improve the motor proficiency levels of the experimental group. The motor intervention programme comprised of 18 group sessions (comprising of 30 min offered 3 times a week). Therefore, the experimental group partook in a 6-week motor intervention programme comprising 30-minute group sessions 3 times a week. The control group was not exposed to the motor intervention programme; they continued with their prescribed physical education curriculum and academic classes. The primary researcher demonstrated how to perform each motor activity separately and then learners were instructed to perform the demonstrated motor activity.

Once the motor intervention programme had been concluded, testing using the BOT-2 Brief Form commenced by four qualified occupational therapists. The researcher trained the occupational therapists to administer the BOT-2 Brief Form to have consistency between the pre- and post-test. The occupational therapists tested the learners after they had received their food from the school. Furthermore, the post-test was conducted by the occupational therapists to ensure that the researcher was blinded to the post-test data. All four of the occupational therapists hold a Bachelor's degree in Occupational Therapy and had experience, ranging from six up to 18 years, of working with learners with special needs. The testing during the pre- and post-test was conducted by the primary researcher as well as the occupational therapists according to the prescribed guidelines of the BOT-2 Brief Form manual. The motor intervention programme and the testing were conducted in strict accordance to the national required COVID-19 protocols by the primary researcher, occupational therapists and the learners.

2.3.1. Measuring instruments

The Bruininks-Oseretsky Test of Motor Proficiency, second edition (BOT-2) is a standardised motor proficiency screening tool driven by motor tasks to evaluate the motor proficiency skills of learners between the ages of four up to 21 years (Deitz et al., 2007; Cools et al., 2009; Bruininks and Bruininks, 2010). Furthermore, it can be used to measure the motor proficiency skills (fine and gross motor skills) of learners with mild to moderate motor proficiency barriers (Bruininks and Bruininks, 2010).

The BOT-2 test comprises four different administrative options to measure the motor proficiency skills of learners, namely the Complete Form, the Short Form, selected composites and the selected subtests (Bruininks and Bruininks, 2005). In addition to the above-mentioned options, a more recent form called the Brief Form is available, with its own manual, record form as well as interpretation norms (Bruininks and Bruininks, 2010). The BOT-2 Brief Form assesses the motor proficiency skills in four main areas, namely fine manual control, manual coordination, body coordination, and agility and strength (Bruininks and Bruininks, 2010). Furthermore, these four areas are divided into 8 different subtests. The eight subtests consist of fine motor precision, fine motor integration, manual dexterity, bilateral coordination, balance, speed and agility, upper-limb coordination and lastly, strength (Bruininks and Bruininks, 2005).

There are 12 key elements in the BOT-2 Brief Form which investigate at least one testing element from each of the Complete Form subtests (Bruininks and Bruininks, 2010). These elements are the Fine Motor Precision (colouring in a star and drawing a line through a path), the Fine Motor Integration (replicating overlapping circles and a diamond), Manual Dexterity (threading blocks), Bilateral Coordination (touching the nose with the index finger with closed eyes and revolving the thumbs and index fingers), Balance (walking on a straight line), Speed and Agility (single-leg side hopping), Upper-limb Coordination (catching a thrown ball with one hand and dribbling the ball left and right) and Strength (knee push-up) (Bruininks and Bruininks, 2010).

Points are recorded for each subtest and are determined by the raw score. The raw score which is obtained can be converted into a single total score (Bruininks and Bruininks, 2010; Gkotzia et al., 2017). Standard scores are determined by the total score (Cools et al., 2009). Total scores and standard scores are used to determine the age-corresponding descriptive categories and percentile norms (Bruininks and Bruininks, 2005). The motor proficiency skills can be categorised into 5 descriptive categories according to a standard score attained in the BOT-2 Brief Form as follows: Category 1: well-below average motor proficiency ($\leq$30); category 2: below average motor proficiency (31–40); category 3: average motor proficiency (41–59); category 4: above average motor proficiency (60–69) and; category 5: well-above average motor proficiency ($\geq$70) (Bruininks and Bruininks, 2010).

Wuang and Su (2009) pointed out that the BOT-2 is a reliable and receptive test tool to measure the motor proficiency skills of learners with ID. It has correlation values between $r = 0.69$ to $r = 0.77$ for learners between the ages of thirteen to 21 years (Bruininks and Bruininks, 2005). Moreover, the BOT-2 has an inter-rater reliability of $r \geq 0.90$, a test-retest reliability value of $r \geq 0.80$ and a good internal consistency value of $r \geq 0.80$ (Deitz et al., 2007). The construct validity of the BOT-2 test is good with a value of $r = 0.80$ (Cools et al., 2009). The correlation is high (0.80) between the Short Form and the Complete Form (Cools et al., 2009).

2.3.2. Motor intervention programme

A motor intervention programme (see Appendix A) was adapted from Johnstone and Ramon (2011) by the primary researcher, which addressed the integration process specifically the motor intervention amongst the experimental group. The set-up, duration, main focus of the motor activity, and equipment used are described separately for each lesson that was presented (see Appendix A). The focus areas of the motor intervention programme included motor skill development amongst the learners such as balancing skills and laterality (unilateral, bilateral and cross-lateral activities).

2.4. Statistical analysis

Descriptive statistics, namely frequencies and percentages for categorical data, means, and standard deviations and/or medians percentiles for numerical data were calculated per group. The groups were compared by means of the chi-square test or the Fisher's exact test for categorical data, and the Kruskal-Wallis test was used for numerical data. The raw data were captured from the BOT-2 Brief Form electronically into a Microsoft Excel 2016 spreadsheet by the primary researcher and an occupational therapist. The SAS statistical software program was used to analyse the data. A significance level of $p \leq 0.05$ was taken into account and found acceptable for all facets of this study.

2.5. Ethical considerations

The DOE in the Free State province, as well as the principal of the school, gave consent for the research to be conducted on the school premises. Authorisation had been obtained from the Health Sciences Research Ethics Committee at the University of the (blinded) (UFS-HSD2020/0242/2707). Furthermore, parents or legal guardians had to complete the permission document for their child to participate in the research study. All consent forms were written in English and in Sesotho (native language in the area) to offer the parents or legal guardians a choice to read in a language that they understood. Assent forms were also written in English as well as in Sesotho and designed with picture sentences to provide learners with an option to read visually. Approval from parents and learners was mandatory. Furthermore, participation in the study was completely voluntarily.

3. Results

In Table 2 the descriptive data for the difference between the groups can be observed.

The total score (TS) refers to the total points from all the subtests obtained by a learner in the BOT-2 Brief Form. Table 2 displays that the experimental group median total score was 4 whereas the control group had a lower median total score of 2. The experimental group had an interquartile range between 2 and 12, while the control group had a smaller interquartile range of 0–4. The change amid the pre-test and post-test median total score indicates a significant statistical difference ($p = 0.0380$) between the experimental group and the control group. The results suggest that the motor intervention programme significantly influenced the median total score of the experimental group.

The interquartile range of the experimental group for the standard score was 0–10, whereas the interquartile range of the control group was 0 and 3. Although the change in standard score from the pre-test to post-test was not significant ($p = 0.0526$), the p-value indicate a result very close to being significant, with the experimental group having a higher average (2) than the control group (0). The results indicate that the experimental group had a greater median standard score than the control group after the motor intervention programme concluded.

With regards to the percentile rank, the experimental group had an interquartile range of 0.9–9.10, while the interquartile range of the control group was 0–4. Furthermore, the median percentile rank of the experimental group was 1 and the median percentile rank of the control group was 0.09. Results indicate that there was no significant difference ($p = 0.1343$) between both groups from the pre-to post-test in terms of the percentile rank. Although no significant difference was found, it should be mentioned that the interquartile range of the experimental group was higher than that of the control group.

Figure 1 illustrates the pre-test and post-test results of the BOT-2 Brief Form descriptive categories for the experimental and control group. Learners' motor proficiency levels were grouped into five categories as shown in Figure 1 (pre-test vs post-test), which were determined using the standard score and percentile rank.

Most of the learners in the experimental group (74%) and control group (60.8%) had well-below average motor proficiency levels in the pre-test. For the below-average motor proficiency category, 13% of the experimental group and 34.8% of the control group obtained this category. Furthermore, only a few learners of the experimental group (13%) and the control group (4.4%) managed to obtain an average motor proficiency level during the pre-test. With regard to the descriptive categories, there was no significant difference ($p = 0.2040$) between the experimental group and the control group during the pre-test.

Post-test results (Figure 1) show that 46.7% of the experimental group and 52.2% of the control group had a well-below average motor proficiency level. This indicates that there was a reduction in this category of 27.3% for the experimental group and the control group by 8.6% from the pre-test results. Furthermore, learners of the experimental group (26.6%) and the control group (47.8%) had a below average motor proficiency level during the post-test. This shows that the experimental group increased their motor proficiency level in this category by 13.6% from the pre-test to the post-test while the control group also increased by 13%. Interestingly, 26.7% of the experimental group managed to obtain the average motor proficiency level, whereas none of the learners in the control group (0%) managed to acquire this category. Results from the pre-test to post-test show that the experimental group increased their performance by 13.6% in this category whereas the control group in this category was reduced by 4.4%. Thus, results indicate a significant change ($p = 0.0447$) in pre-post test motor proficiency levels between the experimental group and the control group, when observing the descriptive categories. This can be attributed to the influence of the motor intervention programme.

4. Discussion

The results of the present study highlight the importance of presenting a motor intervention programme for learners with ID. The six-week motor intervention programme improved the total scores and the descriptive categories of the experimental group, thus showing an improvement in motor proficiency level in general. The results of the current study are partially comparable to research conducted by Wuang et al. (2013); however, these researchers examined motor proficiency in terms of fine and gross motor skills, whereas the current study examined the total motor proficiency. These researchers used a 20-week occupational home therapy programme for learners with mild to moderate ID. Results revealed that learners in the intervention group significantly improved their motor proficiency level in fine motor skills; however, the intervention programme had little effect on the gross motor skills of these learners (Wuang et al., 2013). Although our study used a motor intervention programme conducted at a school by a movement specialist instead of a home intervention programme, we found that the motor

Table 2. Descriptive data for the difference between the groups in terms of the total score, standard score and percentile rank.

Variable	Experimental Group			Control group			Change
	N	Median	Interquartile range	N	Median	Interquartile range	Test P- Value
Difference TS	15	4.00	2.00–12.00	23	2	0–4.00	0.0380
Difference SC	15	2.00	0–10.00	23	0	0–3.00	0.0526
Difference PR	15	1.00	0.09–9.10	23	0.09	0–4.00	0.1353

N = Sample, TS = Total Score, SC = Standard Score, PR = Percentile Rank, P = Probability.

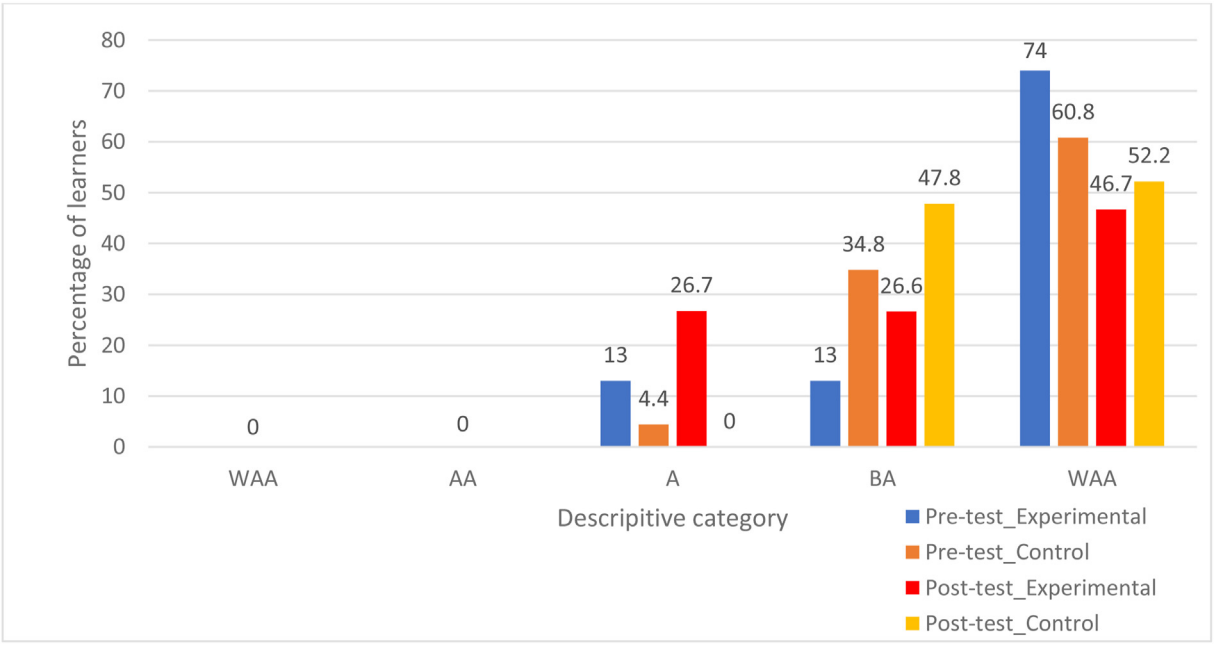

Figure 1. Pre-test vs post-test results of the descriptive category between the experimental and control group according to the standard score and percentile rank achieved on the BOT-2 Brief Form. WAA = Well-Above Average AA = Above Average A = Average BA = Below Average WBA = Well-Below Average p = Probability, <0.05.

intervention programme improved the total motor proficiency of the experimental group. Furthermore, we were present during the motor intervention programme, whereas in the study of Wuang et al. (2013), parents were responsible for providing the home therapy intervention programme (planned by the occupational therapists) to their children. This could have influenced the results of the study, meaning that parents are not movement specialists, and thus had inadequate knowledge on how to perform the activities involving gross motor skills.

In Korea, Jeoung (2018) conducted a research study to examine the motor proficiency levels amongst learners with ID, autism and developmental disabilities. A total of 82 male learners aged from eleven to 20 years old participated in the study. The researchers divided the learners into five categories. The first category included 27 participants with mild ID (50–70); the second category comprised of 19 participants with moderate ID (35–49); the third category included 11 participants with borderline ID (71–79); the fourth category included 15 participants with a developmental disability and lastly, 10 participants were diagnosed with autism (Jeoung, 2018). The researcher used the analysis of variance (ANOVA) to measure the groups according to the subtests (fine motor manual control, manual coordination, body coordination, strength and agility) of the BOT-2 test. The outcome of the study revealed that the mastery rate of motor proficiency was 220.3 ± 53.1 (68.8%) for learners with borderline ID, 188.1 ± 55.5 (58.78%) for learners with mild ID, 124.7 ± 74.02 (38.96%) for learners with moderate ID, 151.7 ± 61.5 (47.4%) for learners with a developmental disorder and 187.5 ± 61.3 (58.5%) for learners with autism (Jeoung, 2018). Findings stated that the overall mastery rate of motor proficiency levels amongst the five categories was 54.5% (Jeoung, 2018). The results are partially comparable to the current study as this researcher used the BOT-2 Complete Form whereas we used the BOT-2 Brief Form. Although we did not examine other developmental disabilities, we found that learners with moderate to severe ID had lower motor proficiency levels (category 1–3) as inference drawn from the study of Jeoung (2018) indicated learners with moderate to mild ID had mastery rate of 39–47.4%.

Another study conducted by Pise et al. (2018) had similar outcomes to the current study. However, it did not examine the fine motor skills and used a longer programme duration. The study explored the effectiveness of a 12-week yoga intervention programme for learners with mild to moderate ID. Learners were divided into a yoga group and a non-yoga group. It was found that the yoga group significantly improved in their gross motor abilities in balancing, coordination, agility and speed whereas the non-yoga group showed no improvement (Pise et al., 2018). We found that the motor intervention programme improved the experimental group's gross motor proficiency skills in terms of running speed and agility, balance, upper-body strength, and bilateral coordination skills while the control group's gross motor proficiency skills showed no improvement.

A recent Turkish study examined the effects of a 12-week hemsball training programme on the motor proficiency levels of learners with mild and moderate ID (Işık and Zorba, 2020). The study consisted of a similar study sample to the current study. Fifty learners (23 with mild ID and 27 moderate ID) were split equally into a control group (n = 25) and a experimental group (n = 25). The 60-minute programme was offered 3 times a week by the researchers. These researchers used three BOT-2 subtests to examine components such as balance, bilateral coordination and upper-limb coordination between the two groups. They found consistent results to ours that the hemsball training programme significantly improved experimental group motor proficiency levels after the programme concluded. More importantly to note is that those learners with moderate ID had improved more significantly in motor proficiency levels opposed to those learners with mild ID (Işık and Zorba, 2020). This certainly indicates the beneficial advantages intervention programmes may offer learners diagnosed with more severe levels of ID.

A study offering 16 sessions of motor therapy programme examined the motor proficiency levels of learners with mild ID (Ashori et al., 2018). These researchers included 26 learners with mild ID that were split into a motor therapy (n = 13) and non-motor therapy group (n = 13). These researchers used a similar test battery (BOT-2 Short Form) as ours to examine the motor proficiency skills of these learners. They found consistent results to ours, in the sense that the motor therapy programme significantly improved the overall motor proficiency levels of the motor therapy group.

5. Conclusion

The results of this study revealed that a motor intervention programme can enhance the motor proficiency levels of learners identified with moderate to severe ID. Furthermore, it can be used as an effective method to improve the total motor proficiency skills of these learners. This certainly may improve learners' confidence to perform daily tasks more effectively and efficiently. Moreover, having improved motor proficiency levels may increase their participation in physical education classes or sporting and recreational activities as it creates responsiveness so that a learner can perform activities with greater control. Additionally, improved motor proficiency levels allow learners with ID to be more active, thereby reducing the risk of becoming overweight or obese which would negatively affect their health-related fitness status. The beneficial gains that a motor intervention programme may offer learners with ID in developing their motor proficiency skills will undoubtedly lead to more meaningful future research studies. Thus, the use of a motor intervention programme is recommended to aid these learners in overcoming motor proficiency barriers. Furthermore, an aspect that was not directly measured but rather observed by the researcher was the fact that the learners enjoyed the motor intervention and were looking forward to the sessions.

6. Recommendation

With these findings and beneficial gains in mind it is recommended that learners with moderate to severe ID be exposed to motor proficiency interventions that would undoubtedly have positive and meaningful effects on their motor proficiency skills.

7. Limitations

The current study made use of only one special South African school, therefore generalisation of results cannot be warranted. Additionally, the population sample used in this study was small and made use of only a narrow age category. It is therefore recommended that a larger population be used, and another age category be examined.

Declarations

Author contribution statement

Jose Marco Fernandes, BA Hon: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Monique De Milander, PhD; Elna van der Merwe, PhD: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data availability statement

The data that has been used is confidential.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

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