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Research Article

Fitness status of visually impaired learners in the Philippines: A sequential explanatory analysis

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ABSTRACT

The increased awareness of the value of physical activity by introducing sports and games in the Physical Education curriculum of special education (SPED) schools in the Philippines has been both a trend and a challenge in program planning, implementation, assessment, and professional background of teachers. To evaluate the benefits of learners' participation in physical activity, this study, therefore, measured and evaluated the health-related physical fitness status of learners in an educational institution for the visually impaired in the Philippines. The health-related physical fitness levels of blind or braille user learners (N = 12) were measured utilizing the following standardized tests: body mass index (BMI); modified sit and reach and zipper tests (flexibility); vertical jump test (power); four-level sit-ups (core strength); and 3-minute step test (cardiorespiratory endurance). Overall results revealed that the participants' health-related physical fitness levels were below normative standards for fitness. Interviews among the special education teachers of the institution also revealed that their minimal training on fitness testing and physical activity programming, including the scarcity of materials and equipment, emerged as common problems encountered by them as far as fitness is concerned. Given the proper training on the conduct and monitoring of physical fitness tests and the facilitation of physical activity-related programs, special education teachers will be able to address the children's needs in physical activity, fitness, and leisure programs. The results of the study will serve as inputs toward the development of a comprehensive fitness and leisure program, especially in SPED schools.

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Introduction

The need to ensure that learners' health is placed at the highest premium has been the primordial role of educational institutions all over the world. This must also be a common undertaking for all learners from different walks of life, including those with additional needs like learners with visual impairment (VI). For instance, in the United States of America, Haegele and Lieberman (2016) revealed that some points that can be considered good practices among schools catering to physical education for the visually impaired are that they hire trained teachers in adapted physical education, design, and implement curricula that meet their national standards, and promotes participation in after-school sports, thereby maximizing the learners' potential to be engaged in an array of physical activities (PAs). As Houwen et al. (2008) and Colak et al. (2004) pointed out, VI learners have "inferior gross motor skills," hence, learners with visual acuities must be provided with ample attention through physical activities to promote an active lifestyle. In support of this, a systematic review of various studies by Paravlic et al. (2015) confirmed that exercise programs set at a minimum of eight (8) weeks improve the "functional, motor and physiological" attributes of VI learners.

Several studies considered the area of physical fitness testing as an area of exploration among VI learners. Short and Winnick (1986) compared the adiposity level of segregated and integrated VI learners and indicated a significantly less percentage of adiposity among integrated students than their counterparts. As in the case of Çolak et al. (2004), they assessed the effects of playing goalball on some measures of physical fitness among blind and visually impaired learners in a school for blind children in Turkey. They recommended the sport to be a means to improve motor skills among VI children.

Environmental settings should also be an important factor to be considered in the development of the fitness and motor skills of VI learners. The reduction of physical activity participation among VI children could potentially be attributed to limited physical activities (Buell, 1950). Short and Winnick (1986) posited the bearing of integration of visually impaired learners in mainstreamed classes to achieve their best fitness results.

The promotion of physical education and sports has been a supreme mandate in the Philippines. It is governed by Article XIV, Section 19 of its 1987 Constitution which encourages the promotion of physical education and sports. In line with this, Republic Act 7277 or the Magna Carta for Disabled Persons encourages schools "to take into account the special needs of disabled persons concerning the use of school facilities, class schedules, physical education requirements and other pertinent consideration" as per section 12 of its second chapter. Relevant to this, section 15 of the law mandates the state to provide training programs through the development and implementation of sports and physical fitness programs aligned with the nature of their needs.

Limited studies have been noted in terms of publication in the Philippine setting regarding the assessment and evaluation of the fitness status of visually impaired learners. Hence, this study aimed to document the fitness profile of visually impaired learners in an educational institution for the blind in Northern Luzon, Philippines, and explore the prevailing condition of the institution as far as physical activity and fitness are concerned. The results of this study will be a significant input toward the development of a comprehensive fitness and leisure program for Filipino visually impaired learners. It will also pave the way for future undertakings to optimize the status of health and wellness of learners of other similar institutions in the Philippines.

Methods

The study employed a sequential explanatory mixed methods research design to document the fitness status of the participants. The quantitative data collection and analysis were followed by qualitative data collection and

analysis before the data were integrated in this strategy (Terrell, 2012). The study obtained quantitative data on the fitness profile of the participants and were further analyzed, statistically. Follow-up interviews among the SPED teachers and actual observation of the school vicinity constituted the qualitative inquiry and further interpretation.

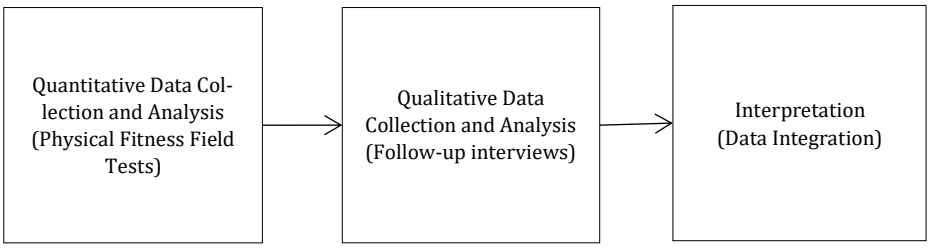

Figure 1. Sequential explanatory strategy framework of the fitness status of visually impaired learners (adapted from Terrell, 2012)

The participants of the study included 12 visually impaired or braille-user learners. The participants had no other noted disability along with their visual impairment. All of them came from an institution for visually impaired children in Northern Luzon, recognized by the Department of Education of the Philippines. Permission was sought from the authorities of the institution and assent forms were accomplished. The VI learners came from several provinces of Northern Luzon such as Pangasinan, Benguet, and La Union. The school is equipped with braille instructional materials, arts and crafts, and musical instruments, among others. Some of them stay in the school while others live in their nearby home in the province.

To obtain data necessary for the profile of the participants' physical fitness, field tests were administered in the following logical sequence to ensure reliable findings; viz: anthropometric tests such as height and weight to compute their body mass index (BMI); non-fatiguing tests such as modified sit and reach for flexibility of the back and both lower extremities, and zipper tests for flexibility of upper extremities; maximum power and strength tests such as vertical jump test for the explosive power of the lower extremities, and four-level sit ups for core strength; and aerobic capacity test such as 3-minute step test for cardiorespiratory endurance. All data gathered were recorded in a score card where the names of the participants were initially encoded.

Physical Fitness Test Components. The following field tests were administered to the visually impaired learners to measure various fitness components.

Body Mass Index (BMI). The Body Mass Index is a ratio of a person's weight to height squared (kg/m^2) which is used to estimate the risk of weight-related health problems. BMI is a metric that measures excess body weight in relation to height (Himes & Dietz, 1994). It is not a direct measure of body fat but has been shown to correlate with body fat (Mei et al., 2002). The researchers computed the participants' BMI using the formula "BMI (kg/m^2) = Body Weight (kg)/Height (m)^2. Data Classification for BMI by the World Health Organization (2004) are: Underweight ≤18.5 kg/m^2; Normal = 18.5-24.9.0 kg/m^2; Overweight = 25.0-29.9 kg/m^2; and Obese ≥30.0 kg/m^2". A weighing scale and a tape measure taped on the wall were the materials used to obtain measurements of weight and height, respectively.

Body Fat Percentage. The researchers of this study made use of the Body Fat Percentage Calculator (http://www.healthiack.com) to measure the approximate Body Fat Percentage of the participants of this study. The proportion of fat mass in an individual's body weight is called body fat percentage (%BF). Body fat percentage, compared to BMI, has been proven in previous studies to be a more useful measurement of body composition (Bandyopadhyay, 2007; Imamura, et al., 2008). Body Fat Percentage has the following

categories: Essential Fat = 2-5%; Athlete = 6-13%; Fitness = 14-17%; Average = 18-24%; and Obese ≥ 24%. Using the Body Fat Percentage, Body Lean Mass Percentage can be obtained by subtracting the Body Fat Percentage from 100. This measure is important in this study because it served as the component representing the body composition in health-related fitness, aside from BMI when overall physical fitness was computed.

VO_2max Calculator (mL·kg-1·min-1). The researchers utilized the VO_2max Calculator (http://www.shapesense.com). No physical exertion is required for this VO_2max calculator. The resting heart rate is simply measured for 20 seconds and encoded together with the participant's age on the online form. The VO_2max is automatically computed and displayed by the computer. The VO_2max classification used are: Superior = 56+; Excellent = 51-55; Good = 46-50; Fair = 42-45; and Poor ≤ 41.

Modified Sit and Reach Test. The Sit and Reach Test specifically measures the flexibility of the lower back and hamstring muscles for both lower extremities (BLE). Wells and Dillon (1952) were the first to describe this test, and it is now extensively used as a general flexibility test. This test requires sitting on the floor with the legs straight ahead. Shoes are removed. The participant stretches forward as far as possible along the measuring line with palms facing downwards and hands on top of each other, holding that position for two seconds while the distance is recorded. The measure that does not reach the toes is negative and any reach past the toes is positive. Norms for flexibility of BLE are: 0 = ≤ 18 cm; 1 = 18 to 24 cm; 2 = 25 to 32 cm; 3 = 33 to 36 cm; 4 = 37 to 43 cm; and 5 = ≥ 43 cm.

Zipper Test. The Zipper Test measures the participants' both upper extremities (BUE). It is somehow similar to Back Scratch Test. The Back Scratch Test, or simply the Scratch Test, measures how close the hands can be brought together behind the back. The participant stands up and places one hand behind his head and back over his shoulder, reaching as far as possible down the middle of his back, palm touching the body and fingers pointing downwards. The other arm is extended as far as possible behind his back, attempting to touch or overlap both hands' middle fingers. The distance between the tips of the middle fingers is measured. The score is zero if the fingertips touch, a negative score if the fingertips do not touch, and if they overlap, a positive score is recorded. The test is done on the other side to test both upper extremities (BUE). Norms for flexibility of BUE are: "0 = did not touch fingers; 1 = touched only tip of fingers; 2 = fingers overlapped by 1 to 2 cm; 3 = fingers overlapped by 3 to 4 cm; 4 = fingers overlapped by 5 to 7 cm; and 5 = finger overlapped by 8 cm or more".

Four-Level Abdominal Strength Test. The researchers utilized the 4-Level Abdominal Strength Test to measure lower back and abdominal strength, which are important for core stability. The four levels are: "1 = the participant can perform a leg sit up with the knees at right angles and feet held, 2 = the participant can perform a leg sit up with the knees at right angles and the feet are not held, 3 = the participant can perform a straight leg sit up with the feet held, and 4 = the participant can perform a straight leg sit up with the feet not held". A score of zero (0) is given for participants who could not perform the test.

Vertical Jump Test. The researchers utilized the Vertical Jump Test to measure the leg muscle power of the participants of this study. The participant is instructed to try to touch the wall at the highest point of the jump in this test. The score is the difference in height between the standing reach and the jump height. The best of three attempts is recorded. The normative standards for power are: 1 ≤ 21 cm; 2 = 21-30 cm; 3 = 31-40 cm; 4 = 41-50 cm; and 5 ≥ 50 cm.

Before the data-gathering procedures, permission was sought from the institution's authorities. Upon approval, a group of human movement science specialists with training on fitness testing and evaluation from a certain state institution of higher learning assisted the authors in facilitating the field tests.

Since the participants were multi-graded elementary pupils with visual impairment, the tests were facilitated in a form of play to ensure that they are enjoying while undergoing such assessments. This supports the provisions of

the Department of Education Physical Fitness Test Manual (p. 3) that the conduct of tests must be done in a "joyful, challenging, encouraging, and fun-filled environment". Initially, the facilitators introduced themselves by stating their names and shaking hands with the participants. This entails the establishment of rapport and familiarization with the children. Then, the facilitators informed the reason for their visitation. Warm-up and stretching sessions took place after.

In the quantitative part of the study, frequency and percentage were used to describe the profile of the participants in terms of their sex, age, and grade level. Score cards were utilized and mean and standard deviation were used to report the fitness status of the visually impaired learners. Independent samples *T*-test was also used to test differences in their fitness status when grouped according to their sex. Meanwhile, in analyzing the qualitative phase of the study via the teachers' responses, narrative analysis was used to report them as they were integrated to support the quantitative results.

Results

Learners' Demographics

The demographic characteristics of the visually impaired learners are presented in Figures 2, 3, and 4. Figure 2 reports that there are more girls (n = 8) than boys (n = 4) in the study. Considering this data, the institution caters to visually impaired learners on a co-educational basis for admission. The group comprised of a diverse age which includes 7 years old (n = 1), 8 years old (n = 1), 9 years old (n = 3), 10 years old (n = 4), 11 years old (n = 1), and 13 years old (n = 2). Unlike the mainstream Philippine classes, the school caters learners on a multi-graded level including pre-elementary (n = 2), grade one (n = 3), grade two (n = 4), grade four (n = 2), and grade five (n = 1).

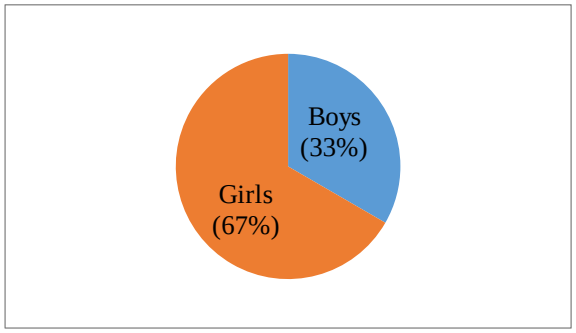

Figure 2. Pie chart distribution of the participants' sex

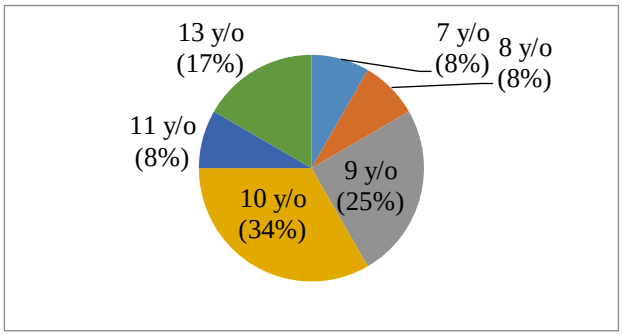

Figure 3. Pie chart distribution of the participants' age

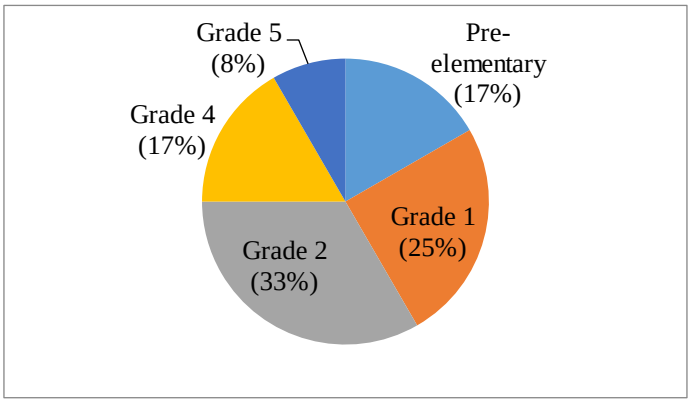

Figure 4. Pie chart distribution of the participants' grade level

The Learners' Fitness Status

The conduct of the physical fitness tests for the learners provided data necessary to determine their fitness status in terms of their body mass index, maximum oxygen uptake, flexibility, and power. Data on the results can be seen in Tables 1 and 2.

Anthropometry and Body Composition of the Learners. Table 1 reports the learners' status on their anthropometry and body composition. In terms of their age, it can be noted that the youngest and shortest in terms of height is case no. 3 while the eldest and the tallest is case no. 6. Anthropometric measures reveal a mean height of 1.31 ± 0.12 meters and a mean weight of 27.48 ± 9.79 kg. Also, looking at the results of the learners' body mass index, it can be surmised that nine (75%) of them are underweight and only three (25%) are normal in classification.

Table 1. Fitness Status of each learner in terms of anthropometry and body composition

Case No.	Age	Height (m)	Weight (kg)	BMI (kg/m^2)	BMI Classification	BF%	BF% Classification
1	10	1.22	18.14	12.19	Underweight	0.7	1
2	10	1.43	27.21	13.31	Underweight	12.9	2
3	7	1.13	13.61	10.66	Underweight	9	2
4	10	1.28	35	21.36	Normal	22.5	4
5	10	1.45	38.55	18.33	Underweight	18.9	4
6	13	1.52	36.28	15.7	Underweight	5.6	1
7	11	1.38	24.94	13.1	Underweight	12.6	2
8	13	1.4	47.62	24.3	Normal	26.8	5
9	8	1.26	18.14	11.43	Underweight	10.2	2
10	9	1.2	18.14	12.6	Underweight	1	1
11	9	1.22	22.68	15.23	Underweight	14.9	3
12	9	1.23	29.48	19.48	Normal	9.2	2

Flexibility, Core Strength, Power, and Maximum Oxygen Uptake of the Learners. Table 2 shows the learners' fitness status in terms of their flexibility, core strength, power, and maximum oxygen uptake. Looking at their flexibility of the left and right upper extremities tested via zipper test, 66.67% or 8 of them failed to reach the tip of their fingers as indicated with 0 cm while only 33.33% or 4 were able to make it. On the other hand, through the seat and reach test, of all the twelve children, 4 (33.33%) of them did not make it as indicative of a 0 rating while the rest (66.67%) obtained a score but still below the average. Interestingly, the four-level sit-ups which tested the core strength of the children yielded 6 (50%) of them to be able to obtain level 4 while the other half just made it to the 1st level. Also, through the vertical jump test, leg power was tested, and results show that 5 (41.67%) of them met the middle level while the rest are below the average standard. Lastly, all of them have poor VO_2max results.

Table 2. Fitness Status of each learner in terms of other fitness components

Case No.	Flex LUE (cm)	Class	Flex RUE (cm)	Class	Flex BLE (cm)	Class	Core Str.	Class	Power (cm)	Class	VO_2max $mL \cdot kg^{-1} \cdot min^{-1}$	Class
1	0	0/6	0	0/6	32	2/6	4	4/4	20	1/5	33	Poor
2	4	3/6	5	4/6	18.5	1/6	4	4/4	18.33	1/5	37	Poor
3	0	0/6	0	0/6	19.5	1/6	1	¼	29.33	2/5	36	Poor
4	5	5/6	2	2/6	31	2/6	1	¼	34.33	3/5	32	Poor
5	0	0/6	0	0/6	24.5	1/6	1	¼	29	2/5	31	Poor

Case No.	Flex LUE (cm)	Class	Flex RUE (cm)	Class	Flex BLE (cm)	Class	Core Str.	Class	Power (cm)	Class	VO_2max $mL \cdot kg^{-1} \cdot min^{-1}$	Class
6	4.5	3/6	2.5	2/6	22	1/6	4	4/4	38	3/5	32	Poor
7	0	0/6	0	0/6	11	0/6	1	¼	38.67	3/5	24	Poor
8	0	0/6	0	0/6	29.5	2/6	4	4/4	15.33	1/5	26	Poor
9	0	0/6	0	0/6	14	0/6	4	4/4	30	2/5	37	Poor
10	0	0/6	3	3/6	10.5	0/6	1	¼	32.33	3/5	30	Poor
11	2.5	2/6	0	0/6	14	0/6	4	4/4	17.67	1/5	37	Poor
12	0	0/6	0	0/6	24	1/6	1	¼	32.33	3/5	33	Poor

Table 3 shows the mean scores, standard deviation, and classification of the fitness components that include body mass index (BMI), body fat percentage (BF%), the flexibility of the left (Flex LUE) and right upper extremities (Flex RUE), flexibility of both lower extremities (Flex BLE), core strength (Core Str.), power and maximum oxygen uptake (VO2max). In general, the learners are classified as underweight, their body fat percentage is below fitness standards, and they also have below average standards in all flexibility tests of both upper and lower extremities, poor core strength, power, and VO_2max. This denotes a poor overall fitness evaluation and does not meet normative standards for fitness.

Table 3. Mean scores, SD, and classification of the learners' fitness status

Fitness Test Component	Mean Score	*SD*	Classification
BMI	15.641	4.321	Underweight
BF%	12.025	7.956	Below Fitness
Flex LUE	1.333	2.049	Level 2 of 6
Flex RUE	1.042	1.685	Level 2 of 6
Flex BLE	20.875	7.580	Level 1 of 6
Core Str.	2.500	1.567	Level 2 of 4
Power	27.943	8.107	Level 2 of 5
VO_2max	32.333	4.228	Poor

Differences between the children's fitness status when grouped according to their sex

Based on the independent samples *T*-test of the visually impaired children, there is a significant difference in the body fat percentage between the boys and girls ($p = 0.007 < 0.05$) as can be seen in Table 4. However, the *T*-test also shows that there are no significant differences in the flexibility, core strength, power, and VO_2max between and among boys and girls in the institution at the time of fitness testing ($p > 0.05$).

Table 4. Results of the t-test

	t	*df*	*p*
BMI	-0.353	10.000	0.732
BF%	-3.412	10.000	0.007*
Flex_LUE	-0.238	10.000	0.817
Flex_RUE	0.467	10.000	0.650
Flex_BLE	0.388	10.000	0.706
CoreStr	0.000	10.000	1.000
Power	0.809	10.000	0.437
VO_{2max}	-0.184	10.000	0.857

*$p > 0.05$

The Special Educators' Experiences

At the time the physical fitness tests were administered, the three teachers of which one is blind, were observed to have shown interest and curiosity as the processes were going on. This implied that physical fitness was something not so familiar to them and not part of their activities routinely conducted. As one teacher said, "…*pwede rin ba kaming sumubok na gawin ang mga tests*?" (Can we also try doing the tests?). This prompted the notion that the teachers were not accustomed to performing such tests on the children and so the authors along with the company of their testing assistants facilitated the administration of the fitness tests for them. The facilitators also instructed and demonstrated the proper ways to do the tests, how to record them, and interpret the data which the teachers performed after. They also revealed that they do not have enough capacity to undertake such test administration because it has never been part of their training. They also shared that they do not have sufficient knowledge on how to develop programs that would best fit and suffice the needs of children to perform an array of bodily activities.

The Educational Environment

The very nature of the institution is a preparatory school that caters to visually-impaired children before their integration into the mainstream schools where admission is allowed at an age of 6 years old along with the voluntary consent of the parents or guardians. The maximum length of stay of a child is up to three years before their release for inclusive education. It is a residential school that allows children to stay in the institution, but others may also opt to be brought by the parent daily, especially those who are within the vicinity of the locale.

The researchers conducted an ocular visit around the school after all fitness tests and other programs were held. The school introduces musical and rhythmical activities since they have presented a song to the group accompanied by a guitar played by one of their teachers who is also blind. They were also taught to sing values-oriented songs both in English and Filipino. This was also consistent with the presence of guitars for children's use as seen in Figure 3. Moreover, braille instructional materials were also noted on the shelves inside their mini library as seen in Figure 4. Wooden tables and chairs were also provided where learners can go during reading hours. Also, an indoor open area was observed which serves as a venue for the conduct of various activities in line with the school's plans (Figure 7). Platforms, small chairs, and long tables were also seen.

Figure 5. Guitars were displayed in the school and used by the children in learning music

Figure 6. Instructional materials using the braille system of reading

Figure 7. Indoor open space for the VI children

Discussion

The very nature of physical fitness testing has been proven to be a very significant parameter to ensure that both health and skill are being monitored. These are primarily the bases to develop programs that are tailor-fitted to everyone's needs despite their condition.

Looking into the general fitness status of the learners in the study, all components were classified below normative standards of fitness. The body mass index, a widely used measure of body composition (one of the health-related components of physical fitness) is also used by public and private educational institutions in the Philippines as it was included in the Manual for Physical Fitness Testing of the Department of Education. Results of the study are consistent with the 2015 Survey of the Food and Nutrition Research Institute (FNRI) in the Cordillera Administrative Region in which 1 out of 5 school children (5 - 10 years old) are underweight and 4 out of 100 are considered wasted (thin) "and considered to be a public health problem." Moreover, among pre-adolescent or older children whose age ranges from 10 to 19 years old (where some of the cases in the study belong), the Institute reported that 5 out of 100 are wasted or thin in the region.

The VI children's poor assessment of their VO_2max implies that cardiopulmonary capacities should also be given timely consideration since proper planning of physical activities may yield positive and improving effects. In the study of Singh and Singh (1993) among Malaysian VI participants, they cited no significant differences between active VI participants with that of the sighted counterparts as far as lung functioning is concerned. Sundberg (1982) concluded that high differences were observed between normal and blind participants, these were linked to their varying degrees of participation in physical activity during their childhood years.

The school environment provides meaningful activities in music, arts and crafts, and other fundamental educational concepts such as reading, writing, and arithmetic. On a positive note, as researchers observed the vicinity of the school environment, the institution conforms to the criteria specified by Castaldi as cited in Reyes et al. (2015) on designing educational environments which include adequacy, suitability, efficiency, and economy. However, there is no sufficient open play area where children can play around for some after-school sports or other recreational activities. As Haegele and Lieberman (2016) pointed out, providing a play area for VI children to play around has been a positive practice in the USA among schools that cater to learners with visual impairment.

Conclusion

It is of utmost importance that physical education is taught to all students, including blind or visually-impaired children. There is a persistent need for the VI children to be actively involved in physical activities that would hone their lifelong skills to maintain their health; although careful planning will always be necessary for the success of programs developed for them. The researchers of this study recommend that adapted physical education programs that would develop skill-related and health-related fitness be implemented by the subject institution for the benefit of their blind and visually-impaired learners. The following are some of the applicable adaptations recommended to the subject institution:

1. Expose the VI learners to as many recreational and leisure-time physical activities that are appropriate to their age; start from easy to more difficult skills; use touch to demonstrate body movements, and use descriptive verbal instructions.
2. Encourage physical activities such as rhythmic movements to stationary running or jumping, playing with balls, and stationary biking to promote fitness.
3. Provide auditory accommodations to VI learners such as in playing balls. Use balloons, beeping balls, or balls with bells to facilitate ball-catching and throwing.
4. Promote independent running by using a securely anchored wire or rope with a PVC tube that VI learners could hold while running
5. Encourage dancing to the sound of lively music.

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References

Bandyopadhyay, A. (2007). Anthropometry and body composition in soccer and volleyball players in West Bengal, India. *Journal of Physiological Anthropology, 26*(4), 501-505. https://doi.org/10.2114/jpa2.26.501

Buell, C. (1950). Motor performance of visually-handicapped children. *Journal of Exceptional Children, 17*(3), 69-72. https://doi.org/10.1177/001440295001700302

Department of Education. (n.d.). *DepEd Physical Fitness Manual*. Metro Manila: Department of Education Task Force on School Sports.

Food and Nutrition Research Institute. (2016). The double burden of malnutrition in the Philippines: 2016 regional dissemination forum. Retrieved from http://www.fnri.dost.gov.ph/images/sources/Dissemination/CAR.pdf on May 15, 2018

Haegele, J.A. & Lieberman, L.J. (2016). The current experiences of physical education teachers at schools for blind students in the United States. *Journal of Visual Impairment & Blindness, 110*(5). 323-334. https://doi.org/10.1177/0145482x1611000504

Healthiack (n.d.) Body Fat Percentage Calculator. https://healthiack.com/body-fat-percentage-calculator#calculator

Himes, J., & Dietz, W. (1994). Guidelines for overweight in adolescent preventive services: Recommendations from an expert committee. *American Journal of Clinical Nutrition, 59*(2), 307-316. https://doi.org/10.1093/ajcn/59.2.307

Houwen, S., Hartman, E., & Visscher, C. (2008). Physical activity and motor skills in children with and without visual impairments. *Medicine & Science in Sports & Exercise, 41*(1), 103-109. https://doi.org/10.1249/mss.0b013e318183389d

Imamura, Y., Uto, H., Oketani, M., Hiramine, Y., Hosoyamada, K., Sho, Y., Hiwaki, T., Baba, Y., Tahara, K., Kubozono, O., Kusano, K., & Tsubouchi H. (2008). Association between changes in body composition and the increasing prevalence of fatty liver. *Hepatol Research, 38*(11), 1083-1086. https://doi.org/10.1111/j.1872-034x.2008.00383.x

Mei, Z., Grummer-Strawn, L., Pietrobelli, A., Goulding, A., Goran, M., & Dietz, W. (2002). Validity of body mass index compared with other body-composition screening indexes for assessment of body fatness in children and adolescents. *American Journal of Clinical Nutrition, 75*(6), 978-985. https://doi.org/10.1093/ajcn/75.6.978

National Council on Disability Affairs. (n.d.). RA 7277 – *An act providing for the rehabilitation, self-development and self-reliance of disabled person and their integration into the mainstream of society and for other purposes*. https://www.ncda.gov.ph/disability-laws/republic-acts/republic-act-7277/

Official Gazette. (n.d.) *The 1987 Constitution of the Republic of the Philippines – Article XIV*. Retrieved from https://www.officialgazette.gov.ph/constitutions/the-1987-constitution-of-the-republic-of-the-philippines/the-1987-constitution-of-the-republic-of-the-philippines-article-xiv/

Çolak, T. C., Bamac, B., Aydin, M., Bergün, M. & Ozbek, A. (2004). Physical fitness level of blind and visually impaired goalball team players. *Isokinetics and Exercise Science*, *12*(4), 247-252. https://doi.org/10.3233/ies-2004-0182

Paravlic, A., Aleksandrovic, M., Zivkovic, D., Radovanovic, D., Madic, D., Djordjevic, S., Konicanin, A. (2015). The effects of exercise programs on visually-impaired children: a systematic review study. *Facta Universitatis Series: Physical Education and Sport*, *13*(2), 193 – 201. http://casopisi.junis.ni.ac.rs/index.php/FUPhysEdSport/article/view/1251

Reyes, E., Dizon, E., and Villena, D.K. (2015). *Curriculum development*. Quezon City: Adriana Publishing Co, Inc.

Shapesense. (n.d.). VO2max calculator. http://www.shapesense.com/fitness-exercise/calculators/vo2max-calculator.shtml

Short, X. F., & Winnick, P.J. (1986). The influence of visual impairment on physical fitness test performance. *Journal of Visual Impairment and Blindness, 80*(5), 729-731. https://doi.org/10.1177/0145482x8608000504

Singh, R., & Singh, H. J. (1993). Anthropometric and physiological profiles of active blind Malaysian males. *Journal of Sports Medicine and Physical Fitness, 33*(4), 378-382. https://europepmc.org/article/med/8035586

Sundberg, S. (1982). Maximal oxygen uptake in relation to age in blind and normal boys and girls. *Acta Paediatrica*, *71(4)*, 603–608. https://doi.org/10.1111/j.1651-2227.1982.tb09482.x

Terrell, S. R. (2012). Mixed-methods research methodologies. *The Qualitative Report, 17*(1), 254-280. http://nsuworks.nova.edu/tqr/vol17/iss1/14

Wells, K., & Dillon, E. (1952). The sit and reach - a test of back and leg flexibility. *American Association for Health, Physical Education and Recreation, 23*(1), 115-118. https://doi.org/10.1080/10671188.1952.10761965

World Health Organization (2004). *WHO BMI classification*