

# Deaf-Mute Students Physical Health Development Strategy Research in the Perspective of Education Fair Equalization

Xiangyang Zhang and Shaohua Yu\*

Liaoning University, Shenyang, Liaoning, China

**Abstract:** Focus on disabled people health, improve the disabled social position is another slogan that China has put forward in disabled people work aspects in recent years. As social vulnerable groups, deaf-mute students have attracted more and more attentions in recent years, their physical health becomes more and more important for deaf-mute students education. The paper is established in deaf-mute students' body basic quality, physical health standards and deaf-mute students' physical exercises hobbies, makes concrete analysis of them. Firstly, utilize normality test and discriminant analysis methods to research deaf-mute students' physical test completion all kinds of indicators, and then define their physical health standards. Secondly, on this basis, utilizes numerical analysis method, it analyzes deaf-mute students' physical exercises likability and gender differences, and finally gets conclusions: when carrying out sports test, it should consider deaf-mute students physique and normal students differences, and combine with different genders deaf-mute students' physical quality, formulate different physical health standards. In physical exercises two aspects, deaf-mute students' enthusiasm is obviously lower than normal students, and schoolgirl's preference extent on physical exercises is lower.

**Keywords:** Deaf-mute students, discriminant analysis, gender difference, normality test, physical health, vulnerable groups.

## 1. INTRODUCTION

In recent years, disabled people group has attracted more attentions from people in all walks of life, and it has already founded all kinds of organizations to help disabled people group to live, disabled persons foundation, disabled persons psychological counseling room, Paralympic Games and others, all are by far caring disabled people series activities of the biggest concerns [1].

Cheng Ming-Ji and others in the article "Deaf-mute people physical test indicators criterion correlation degree research" took deaf-mute people physical monitoring indicators as main research directions, researched on every indicator and its correlation degree sizes [2]. The paper by statistical disabled people physical test every item data, made comparative analysis with normal people indicators, utilized correlation degree method to analyze data features, and finally got conclusions. The paper pointed out: Deaf-mute people physical monitoring all kinds of indicators were obviously different from normal people, all kinds of indicators and deaf-mute people physical health were closely linked, the correlation degree sizes and normal people also had significant differences, when analyzing deaf-mute people physique, it should fully consider deaf-mute people physique [3].

Wang Ming-Yuan in the article "Hearing disabled students' physical health test surrogate markers research", took hearing disabled students as main research objects, in the perspective of hearing disabled students, researched on disabled students' physical health test surrogate markers. The

paper referenced formers research results, combined with its own research orientations, got conclusions: in hearing disabled students' physical health test indicators, many indicators could be replaced as other changes significant indicators, as the item of physical health, it could be replaced into height, weight, lung capacity, heart rate and so on, so that more concrete and intuitive researched hearing disabled students' physical health, and meanwhile it also provided orientations for disabled students' physical health research [4].

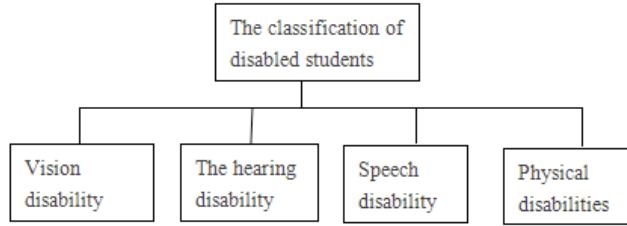
Lu Xiu-Yun in the article "Shanghai city adolescent physical health monitoring management mode exploratory study", took Shanghai city adolescent as an example, researched on his physical health monitoring management mode [5]. The paper summarized formers research results, and carried out exploratory research on adolescent monitoring management mode. The paper pointed out that adolescent physical health detection was very important for adolescent sound growth, its management should break through traditional mode, base on practical status, innovate management mode [6].

The paper utilizes mathematical methods, in the perspective of sports activities, makes quantitative analysis of deaf-mute students' physical health, researches from multiple perspectives, defines deaf-mute people physical health standards to provide orientations and theoretical base for China deaf-mute people group physical health research.

## 2. NORMALITY TEST-BASED DEAF-MUTE STUDENTS' PHYSICAL BASIC QUALITY

According to disabled classification standards, it can divide disabled students into following types: vision

disability, the hearing disability, speech disability, physical disabilities. In general, disabled students' physical quality and health students also have great differences, therefore when implementing all aspects activities; it should consider their physical quality (Fig. 1).



**Fig. (1).** The classification of disabled students.

Above Fig. (1) is disabled students' classification, from which according to different parts disabled extents, it divides into four main kinds. Now by statistical analysis, numerical analysis and discriminant analysis method, make researches on deaf-mute type students physical health standards so that provide theoretical basis for deaf-mute students education works.

## 2.1. Normality Test Thought

Normality test is firstly through hypothesis test calculation, and then generating normal probability graph, and then observing test value conforms to normal distribution or not. Normality test hypothesis is  $H_0$ : data conforms to normal distribution,  $H_1$ : Data doesn't conform to normal distribution.

Hypothesis testing: It is making statistics of inferred another type of important problems. In case that overall distribution function is unknown or only know its forms but don't know its parameters, to infer its overall some features, and then put forward one hypothesis.

Single totality  $N(\mu, \sigma^2)$  average value  $\mu$  testing:

Bilateral testing:  $H_0: \mu = \mu_0, H_1: \mu \neq \mu_0$ ;

Right testing:  $H_0: \mu \leq \mu_0, H_1: \mu > \mu_0$ ;

Left testing:  $H_0: \mu \geq \mu_0, H_1: \mu < \mu_0$

Distribution fit testing:

When it cannot foresee totality conforms which kinds of distribution, it needs to test distribution hypothesis according to samples. Among them, it includes:

**Table 1. Deaf-mute students' physical test completion all kinds of indicators.**

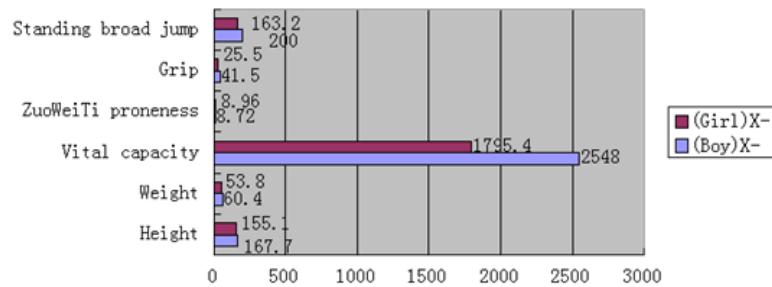
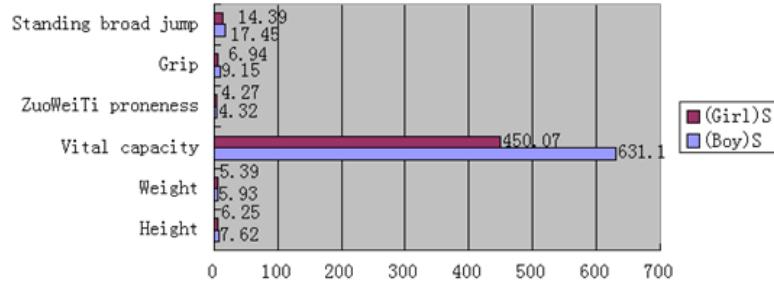
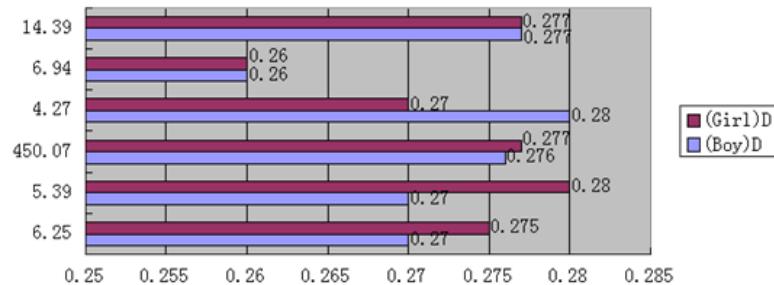
	Height	Weight	Lung Capacity	Step Test	Sit and Reach	Grip	Vertical Jump	Push-up (Men)	Sit-up (Women)	Closed One Leg Standing	Selection Reaction Time
Completion rate%	100	100	100	87.5	90	97.5	85	85	95	100	95

**Table 2.** Test result (Men).

	Height	Weight	Lung Capacity	Sit and Reach	Grip	Standing Long Jump	Push-up	Selection Reaction Time	Closed One Leg Standing
X-	167.7	60.4	2548.0	8.72	41.5	200.0	12.2	0.576	14.5
S	7.62	5.93	631.1	4.32	9.15	17.45	2.14	0.082	5.76
D	0.27	0.27	0.276	0.28	0.26	0.277	0.274	0.273	0.277

**Table 3.** Test result (women).

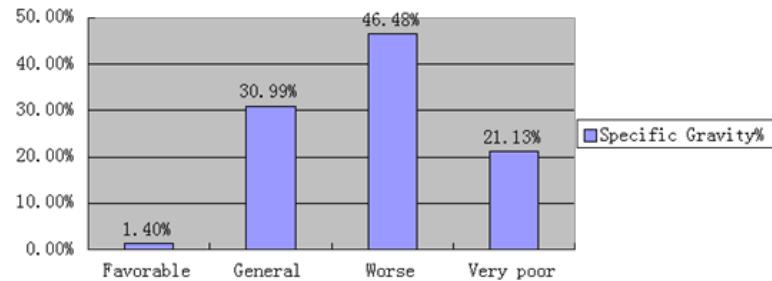
	Height	Weight	Lung Capacity	Sit and Reach	Grip	Standing Long Jump	1min Sit-up	Selection Reaction Time	Closed One Leg Standing
X-	155.1	53.8	1795.4	8.96	25.5	163.2	17.6	0.532	9.2
S	6.25	5.39	450.07	4.27	6.94	14.39	9.84	0.074	4.54
D	0.275	0.28	0.277	0.27	0.26	0.277	0.275	0.274	0.276

**Fig. (2).** The comparison of different gender X.**Fig. (3).** The comparison of different gender S.**Fig. (4).** The comparison of different gender D.

Make comparison of schoolboys and schoolgirls average value  $S$ , it can get following Fig. (3).

Make comparison of schoolboys and schoolgirls average value  $D$ , it can get following Fig. (4).

From above statistical test result, it can get conclusions: for deaf-mute students, their physiques have great differences. When doing lung capacity, sit and reach, grip and other physical testing, their performances have obvious differences. Therefore, when formulating physical criterions,



**Fig. (5).** The deaf students' ability to adapt to the society.

it also should according to their physiques differences, and respective regulate.

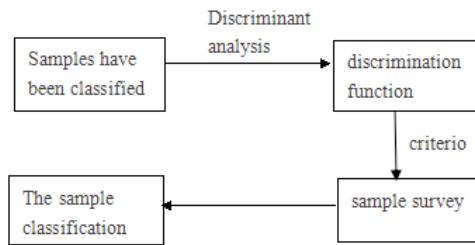
### 3. DISCRIMINANT ANALYSIS METHOD-BASED DEAF-MUTE STUDENTS' PHYSICAL HEALTH STANDARDS RESEARCH

Deaf-mute people are vulnerable group in society, their social positions often lower than normal ones, and are often ridiculed by many people, even suffer discrimination. Due to deaf-mute people physical defects, their social adaptabilities are also different. Below Fig. (5) is Chinese deaf-mute students' social adaptabilities extents reflection.

By above statistical figure, it is clear that deaf-mute students with good social adaptabilities are only small parts of group, most part of deaf-mute students and social adaptabilities are very bad. Therefore, research on deaf-mute students' physical health, and then make contributions to promote their social adaptabilities.

#### 3.1. Guiding Thought

Discriminant analysis is a kind of multiple statistical analysis method; it refers to observe on known evaluation indicators and according to observed data to make classification on evaluation objects. Discriminant analysis general steps are as following Fig. (6).



**Fig. (6).** The discriminant analysis step.

Discriminant analysis refers to carry out discriminant analysis of historical data, and further establish discriminant function, and make classification of observed data. Here, utilize Bayes discriminant analysis to carry out standard research on deaf-mute students' physical health development.

#### 3.2. Establish Discriminant Analysis Model

Bayes discriminant analysis is a kind of method that analyzes two classes or multiple classes' data; here deaf-

mute students' physical health development should accord to their genders and physical exercise items to make analysis, so use Bayes discriminant analysis is most suitable.

Under Bayes discriminant analysis discrimination criterion, established classification function form is:

$$\begin{cases} y_1 = c_{01} + c_{11}x_1 + c_{21}x_2 + c_{31}x_3 + \dots + c_{p1}x_p \\ y_2 = c_{02} + c_{12}x_1 + c_{22}x_2 + c_{32}x_3 + \dots + c_{p2}x_p \\ y_3 = c_{03} + c_{13}x_1 + c_{23}x_2 + c_{33}x_3 + \dots + c_{p3}x_p \\ \dots \\ y_n = c_{0n} + c_{1n}x_1 + c_{2n}x_2 + c_{3n}x_3 + \dots + c_{pn}x_p \end{cases}$$

That is to establish regarding observed indicators and observed objects linear function equations, every equation corresponds to a class discriminant criterion, from which  $c_{0j}, c_{1j}, \dots, c_{pj}, j=1,2,\dots,n$  is estimated parameter. After establishing discriminant functions, input one discriminant correspondingly each parameter value into above discriminant parameter, and then it can know which class the object belongs to.

According to above data, make data processing, and establish Bayes discriminant analysis classification function equation set, so that define deaf-mute students physical health standard.

#### 3.3. Establish Bayes Discriminant Analysis Classification Function

Utilize SPSS software to analyze above Tables 3 and 4 data, and then it can get following classification function regarding deaf-mute students physical health standards:

$$\begin{aligned} y_{boy} = & 0.428x_1 + 0.529x_2 + 1.001x_3 + 0.391x_4 - 0.061x_5 \\ & + 0.225x_6 + 0.467x_7 + 0.575x_8 + 0.624x_9 - 52.621 \end{aligned} \quad (1)$$

$$\begin{aligned} y_{girl} = & 0.353x_1 + 0.425x_2 + 1.031x_3 + 0.322x_4 - 0.054x_5 \\ & + 0.231x_6 + 0.454x_7 + 0.521x_8 + 0.631x_9 - 49.068 \end{aligned} \quad (2)$$

#### 3.4. Improved Bayes Discriminant Analysis Classification Function

In order to improve discrimination accuracy, firstly add one item as prior probability, it makes improvements on above Bayes discriminant analysis classification function equations. Prior probability can properly improve

**Table 4. Physical health standard (men).**

	Height	Weight	Lung Capacity	Sit and Reach	Grip	Standing Long Jump	Push-up	Selection Reaction Time	Closed One Leg Standing
Standard	168.3	61.2	2545.1	8.65	41.2	201.3	12.0	0.575	14.1

**Table 5. Physical health standard (women).**

	Height	Weight	Lung capacity	Sit and reach	Grip	Standing long jump	1min sit-up	Selection reaction time	Closed one leg standing
Standard	156.7	53.2	1799.6	8.89	25.3	161.1	16.2	0.505	8.9

**Table 6. Comparison of deaf-mute students' likability on physical exercises.**

	Special Liking	Prefer	General	Didn't Like	Very Annoying
Proportion%	21.13%	2.82%	19.72%	8.45%	47.89%

discrimination accuracy, its defined criterion is according to lots of documents reports or previous a great deal of samples researches.

On the basis of prior probability, Bayes discriminant analysis classification function is converted into following form:

$$\begin{cases} y_1 = c_{01} + c_{11}x_1 + c_{21}x_2 + c_{31}x_3 + \dots + c_{p1}x_p + \ln(q(y_1)) \\ y_2 = c_{02} + c_{12}x_1 + c_{22}x_2 + c_{32}x_3 + \dots + c_{p2}x_p + \ln(q(y_2)) \\ y_3 = c_{03} + c_{13}x_1 + c_{23}x_2 + c_{33}x_3 + \dots + c_{p3}x_p + \ln(q(y_3)) \\ \dots \\ y_n = c_{0n} + c_{1n}x_1 + c_{2n}x_2 + c_{3n}x_3 + \dots + c_{pn}x_p + \ln(q(y_n)) \end{cases}$$

According to above deaf-mute students' physical health standards status, it can define deaf-mute students' physical health standards priority probabilities are respectively  $q(y_{boy}) = 0.55$ ,  $q(y_{girl}) = 0.45$ .

On the basis of considering prior probabilities, it can further get about deaf-mute students' physical health standards Bayes classification function as following:

$$y_{boy} = 0.428x_1 + 0.529x_2 + 1.001x_3 + 0.391x_4 - 0.061x_5 + 0.225x_6 + 0.467x_7 + 0.575x_8 + 0.624x_9 - 52.621 + \ln(0.55)$$

$$y_{girl} = 0.353x_1 + 0.425x_2 + 1.031x_3 + 0.322x_4 - 0.054x_5 + 0.231x_6 + 0.454x_7 + 0.521x_8 + 0.631x_9 - 49.068 + \ln(0.45)$$

That:

$$y_{boy} = 0.428x_1 + 0.529x_2 + 1.001x_3 + 0.391x_4 - 0.061x_5 + 0.225x_6 + 0.467x_7 + 0.575x_8 + 0.624x_9 - 53.219$$

$$y_{girl} = 0.353x_1 + 0.425x_2 + 1.031x_3 + 0.322x_4 - 0.054x_5 + 0.231x_6 + 0.454x_7 + 0.521x_8 + 0.631x_9 - 49.867$$

Define classification standards:

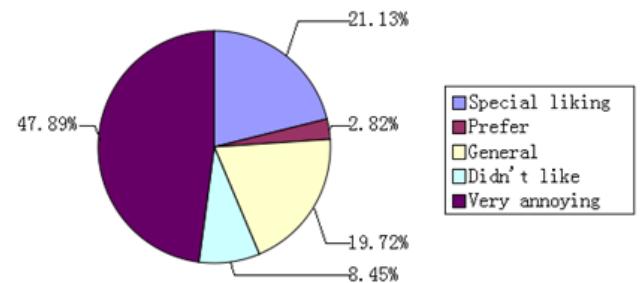
By deaf-mute students' physique researches, combine with above analysis, it can get deaf-mute people physical health all kinds of standards as following Tables 4 and 5.

Above data is different genders' deaf-mute students' physical health standard. By the standard, it is clear that when carrying out different items' physique testing; it should consider deaf-mute students' physical health. With respect to this, to research on deaf-mute students' differences in physical exercises, now carry out following statistical analysis.

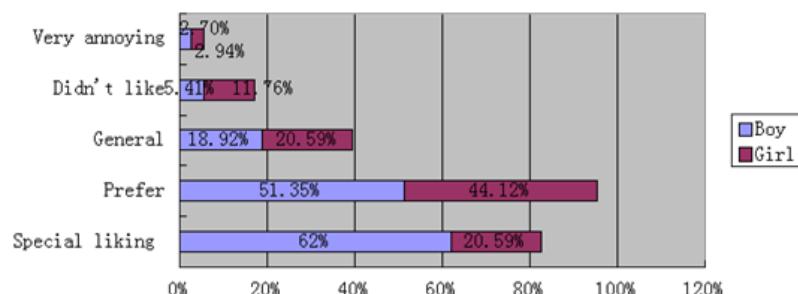
#### 4. DEAF-MUTE STUDENTS' PHYSICAL EXERCISE HOBBIES ANALYSIS

##### 4.1. Deaf-Mute Students' Likability on Physical Exercises

Though deaf-mute students are social vulnerable groups, their physical quality, psychological quality are inferior to normal students, but to sports passion, they are not inferior to normal students. Below Table 6 and Fig. (7) are Chinese deaf-mute students' likability to physical exercise, make numerical analysis of them, and analyze results.

**Fig. (7). The deaf students love the degree of physical exercise.**

By above analysis, it can get conclusions: Chinese deaf-mute students suffer physical quality influences, their enthusiasm on physical exercises is not high, 47.89% deaf-mute students are very annoying with physical exercises, which also has close relations with their psychological health to certain extent.



**Fig. (8).** Deaf students for physical exercise love degree of gender differences.

**Table 7. Deaf-mute students' gender differences in physical exercises likability.**

Unit%	Special Liking	Prefer	General	Didn't Like	Very Annoying
Schoolboys	62%	51.35%	18.92%	5.41%	2.70%
Schoolgirls	20.59%	44.12%	20.59%	11.76%	2.94%

#### 4.2. Deaf-Mute Students Gender Differences in Physical Exercises

Deaf-mute students, except for having differences from normal students in physical exercises, they also have obvious gender differences. Schoolboys' psychological quality is better than schoolgirls, therefore their fondness on physical exercise is higher, and schoolgirls' psychological enduring capacity is lower, they don't like participating in physical exercises type collective activities very much (Fig. 8).

By above Table 7 and Fig. (8) analysis, it can get conclusions: in deaf-mute students schoolboys, 62% students like physical exercises very much, and schoolgirls are only 20.59%, 44.12% schoolgirls just prefer to sports activities. It mainly because deaf-mute schoolgirls are with more inferiority complex and don't like collective activities.

#### CONCLUSION

The paper starts from deaf-mute students physical basic quality and physical health standard as well as deaf-mute students' physical exercise hobbies, makes research on deaf-mute students. Firstly, utilize normality test methods, analyze deaf-mute students physical test completion all kinds of indicators, and then get conclusions: deaf-mute students' physique compares to normal students, they have great differences, and genders differences are remarkable, when taking sports test, it should respective carry out with different physical standards.

Secondly, the paper utilizes numerical analysis and discriminant analysis method, first researches deaf-mute students' physical health standards, and on this basis, analyzes deaf-mute students' likability on sports, and then gets conclusions: when carrying out different events physical tests,

different genders deaf-mute students physical health standards are different. Suffering physical quality influences, deaf-mute students enthusiasm on physical exercises is not high, most of deaf-mute students are very annoying with physical exercises, and gender difference is prominent, schoolboys preference on physical exercises are higher while schoolgirls are lower.

#### CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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#### REFERENCES

- [1] L. Yin, and H. Cai-hua, "Influence of sports self-concept and self-efficacy on sports practice of university students," *J. Sports. Ad. Educ.*, vol. 27, no. 6, pp. 32-35, 2011.
- [2] L. Jian-qiang, "Comparative research on difference between body shape and function and physical fitness of college students for different body-mass index level," *J. Pla Inst. Phys. Educ.*, vol. 30, no. 1, pp. 125-128, 2011.
- [3] L. Hao, L. Lei, L. Li-ping, L.V. Xiao-mei, and Y. Ling-wei, "The analysis and research of the comprehensive intervention measures on over-weight or obesity middle-aged groups in hebei province," *J. Hebei Inst. Phys. Educ.*, vol. 22, no. 6, 2008.
- [4] N. Jian-li, "Study of transformation of college students' exercise methods," *Bull. Sport Sci. Technol.*, vol. 21, no. 4, pp. 85-87, 90, 2013.
- [5] S. Dongzhe, and Y. Guang, "Study on physical characteristics and influencing factors of fat students with difference physical exercise," *J. Hubei Sports Sci.*, vol. 32, no. 3, pp. 215-217, 2013.
- [6] Y. Qiu-bo, and X. Hai-xiao, "Research on the differences of spare time exercise behavior between two different body weight students," *Zhejiang Sport. Sci.*, vol. 35, no. 5, 2013.

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