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Distribution of grades and percentile norms of students of physical education for locomotor competence

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Abstract
Study Aim: The aim of the study was to construct distribution of Grades and Percentile Norms of Students of Physical Education for Locomotor Competence.
Material and Methods: The research study included seventy-five (N=75) female subjects, ages 18 to 25, from the Guru Nanak Dev University's Department of Physical Education in Amritsar, Punjab, India. The Locomotor competence (viz., Speed ability & Jumping ability), Object control competence (viz., Dribbling ability & Throwing ability) and Balance competence were taken into consideration for this study.
Statistical Analysis: The normality of the data was checked by using the Shapiro-Wilk (SW) Test of Normality. Under the data analysis, exploration of data was made with descriptive statistics and graphical analysis. Distribution of Grades under Normal Distribution was used, further it was sorted into five grades i.e., Very Poor, Poor, Average, Good and Excellent.
Results: In Speed Ability: - The Rating above10.972 was very poor, 10.972-10.466 was poor, 10.466-9.454 was average, 9.454-8.948 was good whereas, rating below 8.948 was excellent. In Jumping Ability: - The Rating below 1.305 was very poor, 1.305-1.385 was poor, 1.385-1.545 was average, 1.545-1.625 was good whereas, rating above 1.625 was excellent. In Dribbling Ability: - The Rating above 36.457 was very poor, 36.457-32.521 was poor, 32.521-24.649 was average, 24.649-20.713 was good whereas, rating below 20.713 was excellent. In Throwing Ability: - The Rating below 2.138 was very poor, 2.138-2.695 was poor, 2.695-3.809 was average, 3.809-4.366 was good whereas, rating above 4.366 was excellent. In Balance: - The Rating below 7.594 was very poor, 7.594-12.196 was poor, 12.196-21.4 was average, 21.4-26.002 was good whereas, rating above 26.002 was excellent.

Keywords: Norms, locomotor competence, object control competence, balance competence

Introduction
The transition from secondary school to university is often accompanied by unhealthy behaviour changes such as decreasing physical activity and increasing sedentary behaviour [1, 2]. According to Keating's review [3], 40-50% of college students are physically inactive. A more recent study in Czech university students reported that only 9% met the criterion of 10,000 steps every day [4]. Concerning sedentary behaviour, a UK study revealed that university students spent eight hours per day on sedentary activities such as studying, watching television, gaming, computer activities, sitting and talking, shopping and hanging out [5]. A great body of literature points out that higher physical activity levels are associated with lower health risks (incl. overweight and obesity related diseases) [6, 7]. To counteract the negative effects of physical inactivity and promote health, the WHO recommends at least 150 min of at least moderate or 75 min of vigorous physical activity per week, complemented by strength training twice a week [8]. Regarding the total PA, which includes light-intensity PA like walking, the highest health-gains are reported to be occurring at 3,000 metabolic equivalent of task- (MET-) min/week [9].

Materials and Methods
The research study included seventy-five (N=75) female subjects, ages 18 to 25, from the Guru Nanak Dev University's Department of Physical Education in Amritsar, Punjab, India.

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The following motor competence abilities were taken into consideration for this study:

Motor Competence:
1. Locomotor Competence:
- Speed Ability
- Jumping Ability
2. Object Control Competence:
- Dribbling Ability
- Throwing Ability
3. Balance Competence

Statistical Analysis
- The normality of the data was checked by using the Shapiro-Wilk (SW) Test of Normality.
- Under the data analysis, exploration of data was made with descriptive statistics and graphical analysis.
- Distribution of Grades under Normal Distribution was used, further it was sorted into five grades i.e.,
1. Very Poor
2. Poor
3. Average
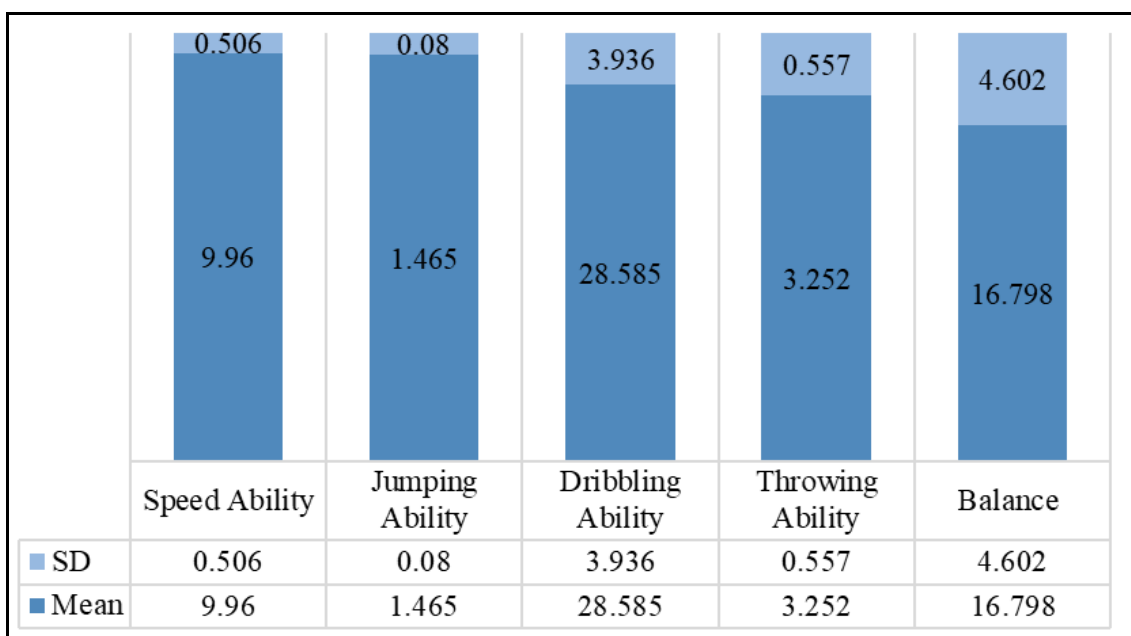4. Good
5. Excellent

Results

Table 1: Descriptive statistics of subjects for Locomotor competence (viz., Speed ability & Jumping ability), Object control competence (viz., Dribbling ability & Throwing ability) and Balance competence.

Sr. No.	Physical Fitness	Mean (X) & Standard Deviation (SD)		Max.	Min.
1.	Speed Ability	Mean	9.960	10.9	9.22
		SD	0.506		
2.	Jumping Ability	Mean	1.465	1.60	1.32
		SD	0.080		
3.	Dribbling Ability	Mean	28.585	34.76	18.90
		SD	3.936		
4.	Throwing Ability	Mean	3.252	4.32	2.15
		SD	0.557		
5.	Balance	Mean	16.798	24.56	7.13
		SD	4.602		

1. **In Speed Ability:** The Mean (X) & Standard Deviation (SD) counts was 9.960 and 0.506 respectively, whereas the maximum and minimum counts was 10.9 and 9.22 reciprocally.
2. **In Jumping Ability:** The Mean (X) & Standard Deviation (SD) counts was 1.465 and 0.080 respectively, whereas the maximum and minimum counts was 1.60 and 1.32 reciprocally.
3. **In Dribbling Ability:** The Mean (X) & Standard Deviation (SD) counts was 28.585 and 3.936 respectively, whereas the maximum and minimum counts was 34.76 and 18.90 reciprocally.
4. **In Throwing Ability:** The Mean (X) & Standard Deviation (SD) counts was 3.252 and 0.557 respectively, whereas the maximum and minimum counts was 4.32 and 2.15reciprocally.
5. **In Balance Ability:** The Mean (X) & Standard Deviation (SD) counts was 16.798 and 4.602 respectively, whereas the maximum and minimum counts was 24.56 and 7.13 reciprocally.

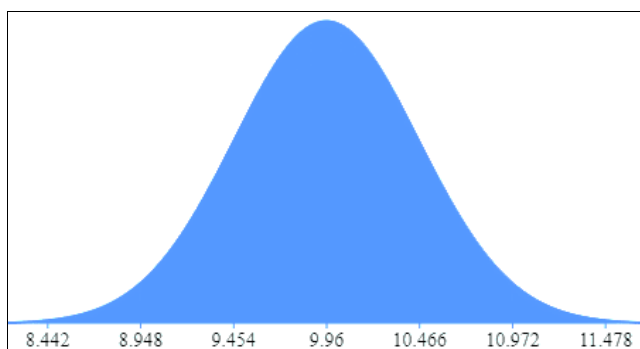|	Speed Ability	Jumping Ability	Dribbling Ability	Throwing Ability	Balance
SD	0.506	0.08	3.936	0.557	4.602
Mean	9.96	1.465	28.585	3.252	16.798

Fig 1: Graphical illustration of subjects for Locomotor competence (viz., Speed ability & Jumping ability), Object control competence (viz., Dribbling ability & Throwing ability) and Balance competence.
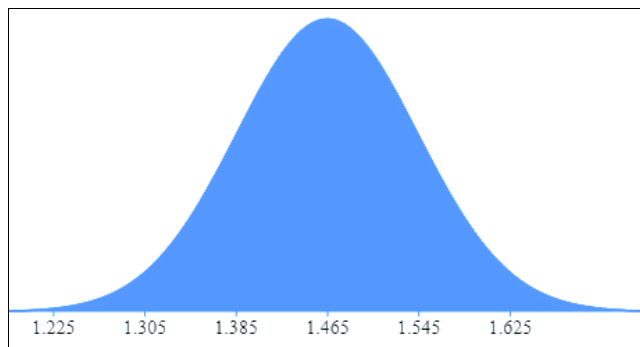
Table 2: Distribution of grades of subjects for Locomotor competence (viz., Speed ability & Jumping ability), Object control competence (viz., Dribbling ability & Throwing ability) and Balance competence.

| Motor Competence		Very Poor	Poor	Average	Good	Excellent
Locomotor Competence	Speed Ability	Rating Above 10.972	10.972-10.466	10.466-9.454	9.454-8.948	Below 8.948
	Jumping Ability	Rating Below 1.305	1.305-1.385	1.385-1.545	1.545-1.625	Above 1.625
Object Control Competence	Dribbling Ability	Rating Above 36.457	36.457-32.521	32.521-24.649	24.649-20.713	Below 20.713
	Throwing Ability	Rating Below 2.138	2.138-2.695	2.695-3.809	3.809-4.366	Above 4.366
Balance Competence	Balance	Rating Below 7.594	7.594-12.196	12.196-21.4	21.4-26.002	Above 26.002

1. **In Speed Ability:** The Rating above 10.972 was very poor, 10.972-10.466 was poor, 10.466-9.454 was average, 9.454-8.948 was good whereas, rating below 8.948 was excellent.
2. **In Jumping Ability:** The Rating below 1.305 was very poor, 1.305-1.385 was poor, 1.385-1.545 was average, 1.545-1.625 was good whereas, rating above 1.625 was excellent.
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5. **In Balance:** The Rating below 7.594 was very poor, 7.594-12.196 was poor, 12.196-21.4 was average, 21.4-26.002 was good whereas, rating above 26.002 was excellent.
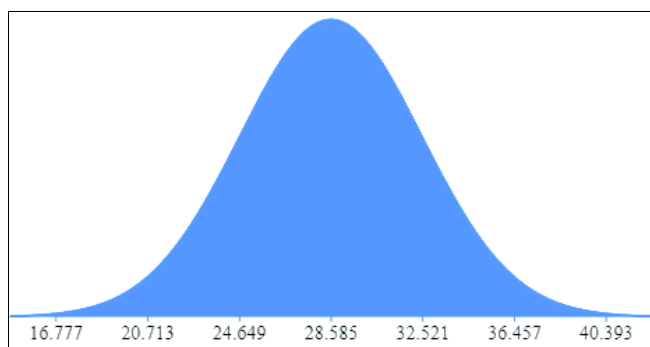

Fig 2: Area Under the normal distribution of subjects for Speed Ability
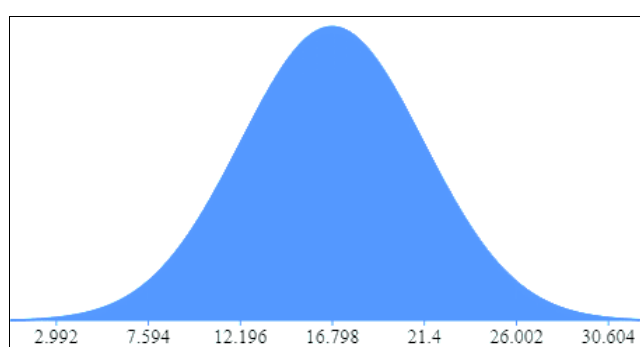

Fig 3: Area Under the normal distribution of subjects for Jumping Ability
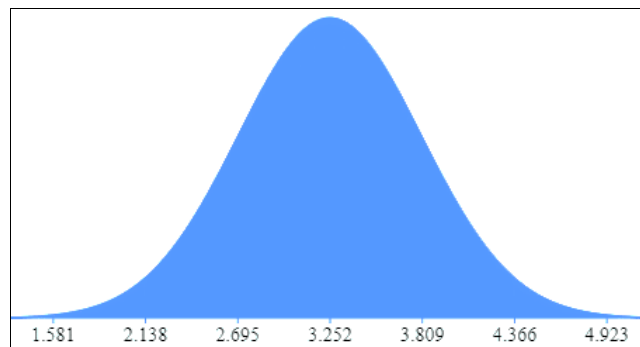
Fig 5: Area Under the normal distribution of subjects for Throwing Ability

Fig 4: Area Under the normal distribution of subjects for Dribbling Ability

Fig 6: Area Under the normal distribution of subjects for Balance

Table 3: Percentile norms of subjects for Locomotor competence (viz., Speed ability & Jumping ability), Object control competence (viz., Dribbling ability & Throwing ability) and Balance competence.

Percentile	Speed Ability	Jumping Ability	Dribbling Ability	Throwing Ability	Balance
10th	9.32	1.354	22.326	2.654	9.31
15th	9.39	1.38	23.76	2.67	12.25
20th	9.418	1.39	24.702	2.776	13.272
25th	9.45	1.39	27.155	2.87	13.605
30th	9.49	1.42	27.74	2.89	13.972
35th	9.519	1.42	28.115	2.9	15.073
40th	9.596	1.43	28.724	2.972	15.51
45th	9.841	1.443	28.994	3.07	16.359
50th	10.13	1.47	29.16	3.15	17.55
55th	10.258	1.49	29.78	3.167	18.747
60th	10.31	1.498	30.104	3.206	19.364
65th	10.321	1.52	30.762	3.432	19.545
70th	10.404	1.52	30.89	3.628	20.024
75th	10.43	1.53	31.61	3.77	20.62
80th	10.482	1.542	31.93	3.89	20.858
85th	10.508	1.56	32.172	3.899	21.311
90th	10.54	1.57	32.722	4.12	21.826

- In Speed Ability: -The 10th percentile is 9.32, 15th percentile is 9.39, 20th percentile is 9.418, 25th percentile is 9.45, 30th percentile is 9.49, 35th percentile is 9.519, 40th percentile is 9.596, 45th percentile is 9.841, 45th percentile is 9.841, 50th percentile is 10.13, 55th percentile is 10.258, 60th percentile is 10.31, 65th percentile is 10.321, 70th percentile is 10.404, 75th percentile is 10.43, 80th percentile 10.482, 85th percentile 10.508 and 90th percentile is 10.54.
- In Jumping Ability: -The 10th percentile is 1.354, 15th percentile is 1.38, 20th percentile is 1.39, 25th percentile is 1.39, 30th percentile is 1.42, 35th percentile is 1.42, 40th percentile is 1.43, 45th percentile is 1.443, 50th percentile is 1.47, 55th percentile is 1.49, 60th percentile is 1.498, 65th percentile is 1.52, 70th percentile is 1.52, 75th percentile is 1.53, 80th percentile 1.542, 85th percentile 1.56 and 90th percentile is 1.57.
- In Dribbling Ability: -The 10th percentile is 22.326, 15th percentile is 23.76, 20th percentile is 24.702, 25th percentile is 27.155, 30th percentile is 27.74, 35th percentile is 28.115, 40th percentile is 28.724, 45th percentile is 28.994, 50th percentile is 29.16, 55th percentile is 29.78, 60th percentile is 30.104, 65th percentile is 30.762, 70th percentile is 30.89, 75th percentile is 31.61, 80th percentile 31.93, 85th percentile 32.172 and 90th percentile is 32.722.
- In Throwing Ability: -The 10th percentile is 2.654, 15th percentile is 2.67, 20th percentile is 2.776, 25th percentile is 2.87, 30th percentile is 2.89, 35th percentile is 2.9, 40th percentile is 2.972, 45th percentile is 3.07, 50th percentile is 3.15, 55th percentile is 3.167, 60th percentile is 3.206, 65th percentile is 3.432, 70th percentile is 3.628, 75th percentile is 3.77, 80th percentile 3.89, 85th percentile 3.899 and 90th percentile is 4.12.
- In Balance: -The 10th percentile is 9.31, 15th percentile is 12.25, 20th percentile is 13.271, 25th percentile is 13.605, 30th percentile is 13.972, 35th percentile is 15.073, 40th percentile is 15.51, 45th percentile is 16.359, 50th percentile is 17.55, 55th percentile is 18.747, 60th percentile is 19.364, 65th percentile is 19.545, 70th percentile is 20.024, 75th percentile is 20.62, 80th percentile 20.858, 85th percentile 21.311 and 90th percentile is 21.826.

Swot analysis

Table 4: SWOT (strengths, weaknesses, opportunities and threats) analysis.

Sr. No.	Swot	Inferences
1.	Strengths	The results of this study can help players, coaches, trainers, instructors, physical education teachers, and others with the following attributes, among others. Motor Competence: 1. Locomotor Competence: • Speed Ability • Jumping Ability 2. Object Control Competence: • Dribbling Ability • Throwing Ability 3. Balance Competence
2.	Weaknesses	Because the diversity of the athletes was limited, it is not viable to extrapolate the results to other sporting situations.
3.	Opportunities	Research may also help develop the foundation for scientific training regimens for different sports.
4.	Threats	If the researcher had considered other variables including interest, attitude, teamwork, home environment, genetic makeup, socioeconomic level, culture, religion, educational background, and nutrition, the study would have been jeopardized.

Conflict of Interest
The authors declare no conflicts of interest.

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