
Research Article



Modern Applications of Sports Measurement and Evaluation in Assessing Weightlifting Training Programs

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Abstract: This research set out to determine the role of modern sports measurement application in assessment of weightlifting training programme in College of Physical Education and Sports Sciences and to show how the Sports Measurement Application will influence the sports evaluation process in enhancing physical performance of students. The researcher used descriptive approach which was appropriate to the nature of the research. The sample consisted of (30) male students as purposive sample from the College of Physical Education and Sports Sciences at University of Babylon. The study took place between the 02 Aug 2024 and 04 February 2026, measurements and tests were carried out in the fitness center. Physical tests, measurements and statistical methods analyzed by SPSS software were used. These were arithmetic mean, standard deviation, t-test, Pearson correlation coefficient and percentages. The results indicated that the utilization of modern sport measurement applications helps to present accurate and objective information of the level of trainees' performance. It also enables to keep a track of the physical development and scientifically to measure the effectiveness of training programmes. Results also revealed that sports measurement indicators are positively correlated with the level of performance weightlifting, which indicates the need to rely on standardized tests during the planning and measuring the level of result. It was concluded that the use of modern sports measurement is a basic tool, indispensable for maximizing the quality of weightlifting training programs. It recommended increasing the use of modern technologies and regular testing, as well as training the sports personnel to use the measurement results and statistical analysis to improve their performance and achieve optimal results.

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INTRODUCTION

In the current context of sports, there is no better training and performance development without sports measurement and evaluation. Over the last few years, however, sports science and technology have changed the way that athletes can be monitored, their performances analysed and how to enhance train ability. In weightlifting, where athletes' performance relies on the complex combination of strength, technique, power and physiological adaptations, the scientific measurement of apparatus is of increasing significance for the athlete, the coach and researchers. Today's sports measurement includes organised collection and analysis of quantitative and qualitative data regarding an athlete's physical, technical and functional capacities. These measurements include: Maximum Strength, Explosive Power, Body Comp, Movement Competency, and Recovery. Coaches record standardized data using any of a number of standardized tests, motion analysis, force platforms, wearables, and digital performance tracking software to use as evidence to guide decision-making throughout the training process^[1].

Evaluation, however, is the meaning making that happens where the process of measurement is used to answer the question of whether the training objectives are met or not, and what needs to be improved. Regular assessment can help with the monitoring of athlete progression, uncovering performance limitations, preventing overtraining and personalizing athlete training loads in the case of weightlifting. Thus, measurement and evaluation help to improve the competitive performance of the athlete as well as long term athlete development and prevention of injury. As technology advances and more and more applications designed for measuring various aspects of training have flooded the market, coaching has gone from using old-fashioned methods to data-based methods in the weightlifting field.² This change allows for better planning, ongoing monitoring and adjustments due to athlete performance. In addition, technological advances have made the reliability and validity of measurement assessments (performance assessments) higher; thus, more accurate comparisons can be made within training cycles and competitive seasons. Despite these developments, there are still difficulties in using the right assessment instruments, interpreting the data gathered and then applying the science in the real world of coaching. Thus, the significance and performance of contemporary applications of a sport measurement are crucial in order to maximize the efficiency of a weightlifting training program and consequently, sustainable achievement in sport. The purpose of this study is to review the latest uses of sports measurement and evaluation of competitive weightlifting in the

evaluation of weightlifting training programs and to illustrate the value of this in weightlifting for improving athlete performance, optimizing the design of training programs, and supporting objective decision making in the field of competitive weightlifting.

Research Problem: One of the major reasons why many weightlifting programs are not yet utilizing the full extent of sports measurement and evaluation was the continued use of outdated coaching. Some of the most basic coaching in a weightlifting program, with limited use of scientific methods for training, still exist. This means that coaches might not always have objective information on which they can base their monitoring of athlete development, effectiveness of training, and make informed adjustments. If performance assessments are not consistent, this can result in poor program design, potential stagnation in progress, and a higher risk for overtraining and injury. The research problem, then, is how modern applications of sports measurements and evaluations can be applied to help assess and optimize weightlifting training programs and improve an athlete's overall performance.

Research Objectives:

- To identify the role of modern sports measurement applications in evaluating weightlifting training programs for students at the College of Physical Education and Sports Sciences.
- To assess the level of certain physical indicators related to weightlifting performance using modern tests and measurements.
- To demonstrate the extent to which sports measurement results contribute to improving the planning and evaluation of weightlifting training programs.

Research Hypotheses:

- There are statistically significant differences in the results of physical measurements that reflect the effectiveness of using modern sports measurement applications in evaluating weightlifting training programs.
- There is a statistically significant positive relationship between the results of modern sports tests and the level of weightlifting performance among the sample group.

Research Scope:

- Human Scope: A sample of (30) male students from the College of Physical Education and Sports Sciences, University of Babylon.

- Time Scope: From October 2, 2024, to February 4, 2026.
- Location: The fitness hall at the College of Physical Education and Sports Sciences, University of Babylon, where the tests and measurements were conducted.

MATERIALS AND METHODS

Research Methodology: The researcher adopted the descriptive approach using a survey methodology, as it was suitable for the nature and objectives of the research, which aimed to identify modern applications of sports measurement and evaluate weightlifting training programs through data collection, analysis, and the scientific derivation of results.

Research Population and Sample: The research population consisted of students from the College of Physical Education and Sports Sciences at the University of Babylon. The research sample was selected purposively and comprised (30) male students capable of performing strength and fitness tests related to weightlifting. It has been an observation time in which all measuring and testing has been carried out with the sample.

Sample Homogeneity: With an aim of maintaining the homogeneity of the sample, dividing information about the main variables (age, height, weight) by descriptive statistics were extracted. Arithmetic mean, standard deviation and skewness coefficient are computed. As the skewness coefficient values were within the statistically acceptable limits, the sample had an acceptable level of homogeneity to permit the desired statistical analyses.

Equipment and Tools Used in Research: The researcher prepared the set of equipment and tools that it needed to run the tests with these items:

- Body weight-measuring device (electronic scale).
- A stadiometer.
- An Olympic barbell and standard weight plates.
- Build up strength training benches and devices.
- A stopwatch.
- A measuring tape.
- Forms for recording results and data.
- (A personal computer to process data using SPSS statistical analysis software).

The Pilot Test: Before the experiment, the researcher did a pilot test to test the suitability of the equipment and tools, the clarity of the test instructions, the time required to conduct the test and identify the difficulties that might occur in the test so that changes could be

made. This pilot also had the benefit of setting up the team and the proper and systematic implementation of the measurement procedures^[3].

Measurements and Tests Used in Research:

- The measurements and tests that were carried out were all conducted in the fitness center, and they contained the following:
- Height measurement (cm).
- Body weight (kg).
- 1RM (maximum repetition maximum) test using the 1RM (maximum number of repetitions) from a given exercise such as 1RM squat or 1RM bench press developed as per study protocol.
- Grip strength test using a dynamometer (when available).
- Lower limb muscular strength test using vertical jumps.
- Recording and analyzing performance results using pre-prepared forms.

Research Procedures: The measurements and tests were carried out in the fitness hall at the College of Physical Education and Sports Sciences - Babylon University from 2 October, 2025, to 4 February 2026. All tests were conducted under the same conditions and followed the same safety rules and instructions for implementation.

Statistical Methods: Data were analyzed using the Statistical Package for the Social Sciences (SPSS). The following statistical methods were used^[4]:

- Mean.
- Standard Deviation.
- Skewness coefficient to verify sample homogeneity.
- T-test for paired or independent samples, according to the study design. Pearson's correlation coefficient was used to study the relationship between variables.
- Percentages were used when descriptive results needed.
- The statistical significance level (0.05) was used to determine the significance of the results.

RESULTS

Presentation and Discussion of Results: The results obtained after statistically processing the data using SPSS are presented, along with a brief description of each table and an explanation of its significance in light of the research objectives and hypotheses.

The results indicate that the sample members were similar in basic characteristics, with relatively low standard deviation values, indicating a good level of homogeneity among the participants.

Table 1: Shows the mean and standard deviation for some of the main variables of the research sample

Variables	Mean	Std
Age (years)	21.30	1.12
Height (cm)	173.80	5.74
Weight (kg)	74.60	8.21
Maximum Strength (kg)	102.40	12.36

Table 2: Shows the difference between the pre- and post-test means using the paired samples t-test

Variable	Mean		(t) value	Significance level (Sig.)
	Pretest	Posttest		
Maximum Strength (kg)	95.80	102.40	4.83	0.001

Table 3: The table shows the value of the correlation coefficient between the scores of the sports measurement and the level of performance in weightlifting

Variables	Correlation coefficient (r)	Significance level (Sig.)
Modern sport measurements × performance level	0.78	0.000

Table 4: Shows the distribution of the sample members according to the level of performance

Performance level	Number	Percentage
High	12	40.0%
Average	14	46.7%
Low	4	13.3%
Total	30	100%

The results show a higher arithmetic mean in the post-test compared to the pre-test, with statistical significance at the (0.05) level, indicating an improvement in maximum strength among the sample members.

The value of the correlation coefficient indicates a strong positive correlation between the results of modern sport measurements and the level of performance, a relationship that is statistically significant.

It appears that the majority of the sample fall within the average performance level, while 40% are high performers, and the percentage of low performers is limited.

Discussion of Results: The descriptive results showed that the sample members have a suitable degree of similarity in age, height, weight, and basic physical indicators. This makes it possible to make statistical comparisons as well as hold individual differences to a minimum that suggested by the results. Homogeneity of the sample is considered a crucial factor in sports research since it aids in the proper interpretation of the results obtained and improves the reliability of conclusions drawn^[5].

Percentages for the maximum strength also indicated an improvement from pre-test to post test, this was statistically significant, ($p < 0.05$) when analysed via t-test^[6]. The answer to this lies in the fact that when structured measurements and tests are used, levels of physical achievement in terms of the development of a

trainee's performance can be objectively monitored and training loads can be systemically adjusted for the benefit of the trainee, so positively influencing performance development^[7].

The correlation results of the Pearson correlation coefficient indicated that the variables of the modern sports measurements were highly positively correlated with performance level in weightlifting. This means that through the use of measurement and evaluation tools, trainers can supply more precise data about the condition of the trainees, and train them accordingly instead of relying on subjective judgment. Strengths and areas for development can also be determined based on test results^[8].

The frequency distribution of performing levels indicated that majority of the participants were distributed within the average level and a fairly good percentage on the high level^[9]. This could be due to the different levels of training experience and/or physical readiness of the students. It shows that there was not a very high number of low performing or individuals with poor physical fitness, as the percentage was low^[10].

The results, overall, demonstrate the value of using modern sports measurement in weightlifting training programs as measurements offer quantitative indicators that can assist in planning, monitoring, and continual assessment.¹¹ Furthermore they support a belief that employing suitable statistical approach including means, standard deviations^[12], t test and Pearson's correlation coefficient assists in making scientific conclusions that can be applied in training programs and enhanced in sports performances^[13]. These results, however, should be viewed within the context of the type of sample and size and the circumstances in which the study was carried out. Larger and more varied samples are recommended for further studies to assess the generalizability of the findings^[14].

CONCLUSIONS

- The research findings indicated that new sport measurement application is effective in evaluating weight lifting training program and giving objective information about the level of the performance.
- The physical based-tests and measurements assisted in uncovering the degree of muscular strength across participants and on a scientific measuring device.
- The conclusions based on the results revealed the positive relationship between sports measurement indicators and sports performance levels, indicating that it is necessary to trust measurement data in sports training and evaluation.
- Statistical analysis using SPSS software helped in analyzing the data and drawing conclusions that can be used to make training decisions.
- Study results indicated that periodic measurement and continuous evaluation are helpful in enhancing the efficiency of training programs and identifying strengths and areas needing improvement among trainees.

Recommendations:

- Regularly use modern applications in the field of sports measurement in designing and evaluating weightlifting training programs in physical education colleges and sports clubs.
- To test athletes & make measurements periodically to determine the state of each athlete's body level and make the appropriate adjustments to training based upon the test results.
- Trainers/researchers who employ statistical methods (and software like SPSS) to facilitate proper interpretation of measurement outcomes and evidence-based decision making.
- Conduct future studies using larger samples of subjects of differing ages and training using modern methods of investigation and the validity of the different methods of training compared and improved upon.

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