



The relationship of selected skills tests to evaluations of basketball playing ability  
by Anne Kruse Olson

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE  
in Physical Education  
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**Abstract:**

The purpose of this study was to determine: (1) if any relationships existed between the skills tests of jump and reach, standing broad jump, dribble, speed pass, two-directional wall, pass, front shot, field goal speed test, or the Lambert speed and accuracy test, (2) if any of these skills tests were related to basketball playing ability as perceived by the coaches and (3) if there was any relationship between basketball playing ability as perceived by the coaches and basketball playing ability as perceived by the players.

Twenty-five members of the 1979-80 Montana State University Women's Varsity and Junior Varsity teams and eighteen members of the 1979-80 Bozeman High School Girls' Varsity and Junior Varsity Basketball teams were the subjects.

Significant correlations ( $p < .05$ ) were found for the Montana State University Women's Basketball team between the following skills tests in order of greatest to least significance: the Lambert speed and accuracy test and the two-directional wall pass; the speed pass and the two-directional wall pass; the speed pass and the jump and reach; the Lambert speed and accuracy test and the front shot; dribble and the front shot; the Lambert speed and accuracy test and the speed pass; the speed pass and broad jump; dribble and the jump and reach; dribble and the two-directional wall pass; front shot and the broad jump; two-directional wall pass and field goal speed test; and the two-directional wall pass and the front shot.

Significant correlations ( $p < .05$ ) were found for the Bozeman High School Girls' Basketball team between the following skills tests in order of greatest to least significance: dribble and the speed pass; jump and reach and the broad jump; and the dribble and the Lambert speed and accuracy test.

Correlations ( $p < .05$ ) between the skills tests and the coaches' ranking for the Montana State University team in order of greatest to least significance showed the skills tests of speed pass, two-directional wall pass, the Lambert speed and accuracy test, jump and reach, and broad jump to be significantly correlated. The Bozeman High School team showed significant correlations ( $p < .05$ ) between the coaches' ranking and skills tests of dribble and the speed pass.

The factor that appeared to correlate ( $p < .05$ ) the most to the coaches' ranking of the Montana State University team was the speed pass. For the Bozeman High School team the factor was the dribble.

There was a significant correlation ( $p < .05$ ) for both teams between the coaches' ranking and the players' ranking of their perceived basketball playing ability.

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EVALUATIONS OF BASKETBALL PLAYING ABILITY

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A thesis submitted in partial fulfillment  
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of

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in

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Approved:

  
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## ABSTRACT

The purpose of this study was to determine: (1) if any relationships existed between the skills tests of jump and reach, standing broad jump, dribble, speed pass, two-directional wall pass, front shot, field goal speed test, or the Lambert speed and accuracy test, (2) if any of these skills tests were related to basketball playing ability as perceived by the coaches and (3) if there was any relationship between basketball playing ability as perceived by the coaches and basketball playing ability as perceived by the players.

Twenty-five members of the 1979-80 Montana State University Women's Varsity and Junior Varsity teams and eighteen members of the 1979-80 Bozeman High School Girls' Varsity and Junior Varsity Basketball teams were the subjects.

Significant correlations ( $p < .05$ ) were found for the Montana State University Women's Basketball team between the following skills tests in order of greatest to least significance: the Lambert speed and accuracy test and the two-directional wall pass; the speed pass and the two-directional wall pass; the speed pass and the jump and reach; the Lambert speed and accuracy test and the front shot; dribble and the front shot; the Lambert speed and accuracy test and the speed pass; the speed pass and broad jump; dribble and the jump and reach; dribble and the two-directional wall pass; front shot and the broad jump; two-directional wall pass and field goal speed test; and the two-directional wall pass and the front shot.

Significant correlations ( $p < .05$ ) were found for the Bozeman High School Girls' Basketball team between the following skills tests in order of greatest to least significance: dribble and the speed pass; jump and reach and the broad jump; and the dribble and the Lambert speed and accuracy test.

Correlations ( $p < .05$ ) between the skills tests and the coaches' ranking for the Montana State University team in order of greatest to least significance showed the skills tests of speed pass, two-directional wall pass, the Lambert speed and accuracy test, jump and reach, and broad jump to be significantly correlated. The Bozeman High School team showed significant correlations ( $p < .05$ ) between the coaches' ranking and skills tests of dribble and the speed pass.

The factor that appeared to correlate ( $p < .05$ ) the most to the coaches' ranking of the Montana State University team was the speed pass. For the Bozeman High School team the factor was the dribble.

There was a significant correlation ( $p < .05$ ) for both teams between the coaches' ranking and the players' ranking of their perceived basketball playing ability.

## Chapter 1

### INTRODUCTION

#### Statement of the Problem

The purpose of this study was to ascertain the relationships of the following selected skills tests to basketball playing ability as perceived by coaches and players. Specifically, an attempt was made to determine:

1. if any significant relationships existed among the performance of the skills tests of jump and reach, standing broad jump, dribble, speed pass, two-directional wall pass, front shot, field goal speed test, or the Lambert speed and accuracy test,
2. if the skills tests of jump and reach, standing broad jump, dribble, speed pass, two directional-wall pass, front shot, field goal speed test, or the Lambert speed and accuracy test were related to basketball playing ability as perceived by coaches,
3. if there were any significant relationships between basketball playing ability as perceived by coaches and basketball playing ability as perceived by players.

#### Justification

Of primary concern to basketball coaches today is the identification of the factors which are indicative of potential basketball

playing ability. Repeated tests have been devised and tested with inconsistent results (Hopkins 1977). Basketball rules have changed and the tests must be adapted to the new styles of play (Lambert 1969).

This study is especially timely because of the current reevaluation of the AAPHER sports skills series, in particular the basketball tests (Baumgartner 1979). If the factors of jump and reach, standing broad jump, dribble, speed pass, two-directional wall pass, front shot, field goal speed test, and Lambert's speed and accuracy test can be used to enhance the prediction of level of performance of basketball, then the task of recruiting and selecting team members will be facilitated.

### Definitions

Basketball playing ability. The basketball playing ability in this study was the ability to play basketball as perceived by coaches and players (Appendix I).

Dribble. Dribble was defined as the speed with which a player can move the ball around obstacles (Appendix C).

Field goal speed test. The field goal speed test was the number of shots made in thirty seconds starting close under the basket (Appendix G). (Also called Scott and French test and Johnson test.)

Front shot. The front shot was the measure of the player's

skill in making shots at the basket from a designated spot to the left of the basket (Appendix F).

Jump and reach. The jump and reach was the measure of the height of a player's jump over and above her reach (Appendix A).

Lambert speed and accuracy test. The Lambert speed and accuracy test was the twice time plus accuracy score it takes for a player to shoot ten shots from an alternating eighteen foot starting mark (Appendix H).

Speed pass. The measurement of the speed with which a player can continue to pass and catch a ball ten times against a wall nine feet away (Appendix D).

Standing broad jump. The standing broad jump was the player's ability to stand, take off from both feet, and jump as far as possible (Appendix B).

Two-directional wall pass. The two-directional wall pass was the ability to pass the ball quickly and with accuracy in two alternating directions (Appendix E).

### Hypothesis

It was hypothesized that there would be no significant relationships among the skills tests of jump and reach, standing broad jump, dribble, speed pass, two-directional wall pass, front shot, field goal speed test, Lambert speed and accuracy test, or between any one

of these factors and basketball playing ability as perceived by the coaches. It was also hypothesized that there would be no significant relationship ( $P < .05$ ) between the basketball playing ability as perceived by coaches and the basketball playing ability as perceived by the players.

#### Delimitations

This study was delimited to two groups, the 25 varsity and junior varsity members of the 1970-80 Montana State University Women's basketball team and the 18 varsity and junior varsity members of the 1979-80 Bozeman High School girls' team. It was further delimited to the ages of the team members that ranged from 18 to 22 years, and from 15 to 18 years, respectively.

The study was delimited to ten experimental factors selected by the researcher: (1) jump and reach, (2) standing broad jump, (3) dribble, (4) speed pass, (5) two-directional wall pass, (6) front shot, (7) field goal speed test, (8) Lambert speed and accuracy test, and basketball playing ability as perceived by (9) coaches and (10) players.

#### Limitations

The study was limited to the validity and reliability of the tests (AAHPER 1966, Lambert 1969, Gaunt 1979). Any personal preconceived biases of the coaches and the players in ranking basketball playing ability also limited the study. No attempt was made to

determine the degree of motivation or the level of fatigue affecting the subjects' execution of the tests. No consideration was given to the effect of anthropometric measures or somatotypes of the subjects on their performance in the selected tests. The potential varsity skill level of the sample also limited the study.

#### Sample

Twenty-five members of the 1979-80 Montana State University women's varsity and junior varsity basketball team and 18 members of the 1979-80 Bozeman High School girls' varsity and junior varsity basketball team were administered the skills tests. Ages ranged from 18 to 22 years and from 15 to 18 years, respectively.

## Chapter 2

### REVIEW OF LITERATURE

Many attempts have been made to objectively measure basketball playing ability. There have been two schools of thought regarding basketball playing ability testing. One area concentrates on using many individual basketball skills tests in order to determine the player's basketball playing abilities. The second avenue of examination involves setting up a single test that combines several basketball skills into a game-like situation. Scott (1938) stated that it is impossible to test all the skills involved in a game. She saw the importance of both schools of thought. She recognized a need for either a battery of skills tests that measures several of the principal skills or a single test that involves more than one skill. Both methods of analysis focus on producing an objective score in order to compare players and predict basketball playing potential. Both types of tests have omitted the intangible, unmeasurable elements such as strategic ability, cooperative team play (Scott 1938), and "athletic potential" (Nelson 1967). The review of literature will be divided into the following categories:

1. Single skills tests.
2. Game-like skills tests.

### Single Skills Tests

Moser (1935) stated that the measurement of skill requires scientifically conducted tests that are valid, reliable, objective and practical in their administration. Many tests that have been devised are impossible for one or two coaches to administer, and the time and space requirements are prohibitive.

Using Thurston's method for determining multiple factors, Wendler (1938) conducted a study on critical analysis of test elements used in physical education. He found four common factors in test performance: (1) strength, (2) velocity or speed of movement, (3) motor educability, and (4) sensorimotor coordination. The basketball skill tests of dribbling, target throw, shooting baskets, and the Johnson test were highly correlated with the factor of motor educability.

Dyer, Schurig, and Apgar (1939) believed that ball handling involved the greatest variety of abilities. These authors enumerated 24 possible combinations in passing the basketball and the same number in catching. They further subdivided ball handling into accuracy and speed in passing while motionless and while in motion, to a stationary player, and to a moving player. All of the authors agreed that there was no single test that had been standardized and validated for use throughout the total basketball playing age range. They believed that motor abilities such as controlling the ball and

the body accurately, speedily, and effectively in relation to other players could be measured objectively through the use of skills testing. They favored the jump and reach test and the bounce and shoot test using separate scales for college, high school and junior high age groups for obtaining an objective score of basketball ability.

A factor analysis of basketball motor ability test items was done in 1952 by Leilich. Fourteen selected basketball test items measuring various aspects of motor performance were analyzed. The data were obtained from a study of 110 college women. The investigator defined basketball motor ability as: "...those measures used to evaluate the efficiency in the manipulation of the body in performing basketball skills." (Leilich: 1952, p. 56). The study found basketball motor ability, related to 40 yard sprint test, and ball handling involving accuracy in goal shooting to be basic in testing basketball skills tests. Leilich proposed as being valid and reliable a three item battery consisting of the Glassow, Colvin and Schwarz bounce and shoot test, the field goal speed test, and the push pass for accuracy. The Glassow, Colvin and Schwarz bounce and shoot test yielded a Chi square of .63 but failed to correlate significantly with the 40 yard sprint test. The investigator hypothesized that the subjects had sacrificed in order to complete the test with accuracy when performing the test. Leilich summarized that the Glassow, Colvin

and Schwarz test significantly measured the aspects of basketball motor ability and the specific ball handling skills common to basketball ability.

Broer (1962) stressed that when a single test or battery "claims to measure" a complicated skill such as playing ability, the validity needs to be proven and evidence shown that the test or tests given do evaluate the student's ability. She also stated that there is no question of the validity of a test that tests a single skill element by the performance of the particular skill in question.

In 1963, Fox and Usilaner claimed that ball handling is the most fundamental requisite in basketball. They stated that regardless of the shooting skill and speed, a player who could not handle the ball would not adjust to offensive styles of play easily.

The American Association for Health, Physical Education, and Recreation (AAHPER 1966) published a nine item test battery in order to facilitate the judging of boys' and girls' basketball playing abilities. The skills tests were the field goal speed test, foul shot, side shot, front shot, speed pass, overarm pass, push pass, dribble and the jump and reach.

Childress (1972) did a factor analysis on the scores of 24 skill tests performed by 106 high school boy basketball players. The six skills tests that he believed were important were (1) Cozen's dodging run, (2) right-hand grip strength, (3) Lehsten's wall bounce,

(4) pull-ups, (5) hand time and movement time, and (6) backward movement time. Cozen's dodging run was the time it took for a player to weave in and out of cones on a 40 yard course. Lehsten's wall bounce was measured by the time it took for a player to pass ten passes to a wall nine feet away so that the ball came back in a bounce pass.

Success at the skills tests of jump shot, jump and reach, and the dribble were found to correlate with player ability in a study done by Fratzke in 1976. Age and height factors also determined player success in that study.

Hopkins believed that the previous factor analysis results of basketball playing ability skills tests were conflicting. He tested 21 items on 70 junior high and high school boys at a University of Minnesota summer basketball camp, 1975. Hopkins believed that a battery of tests could be constructed to measure the domain of basketball playing skill. He concluded that a battery composed of the following test items would provide a quick and objective measure of basketball skill: (1) jump and reach (AAHPER 1966), (2) dribble (AAHPER 1966), (3) speed pass (AAHPER 1966), and (4) front shot (AAHPER 1966).

Gaunt tested 167 female high school basketball players enrolled in the Eastern Kentucky University Sports Camp during the summer of 1977. The subjects ranged in age from 13 to 18 years of age. She

concluded that to measure basketball playing ability the following skills tests should be used: (1) dribble (AAHPER 1966), (2) standing broad jump (AAHPER 1966), (3) field goal speed test (AAHPER 1966), and (4) two-directional wall pass (AAHPER 1966).

Hopkins conducted another factor analysis study in 1978 using the AAHPER 1966 basketball skills tests for women. The nine items of the test were administered to 60 girls ranging in age from 13 to 18 years old. He suggested that the administration and evaluation of the two skills tests of the field goal speed test (AAHPER 1966) and the dribble (AAHPER 1966) would provide a quick, objective, efficient, and preliminary assessment of a large group of highly skilled women basketball players.

In summary, there is no consensus of professional opinion on which skills tests would provide an evaluation of basketball playing ability for either sex or for any specific age level.

#### Game-like Skills Tests

The second avenue of examination involved setting up a test to objectively measure basketball playing ability in a game-like situation. This single test would involve testing more than one skill in order to get an objective score.

Edgren (1932) was among the first to devise a basketball test for college men based on statistical evidence. He concluded speed

passing, accuracy passing, pivoting and shooting, speed dribbling, accuracy shooting and ball handling into one game-like test. A significant relationship was obtained between the test and the subjective ratings of the performance of the players.

Young and Moser (1934) reviewed 36 tests and reported a short battery of tests to measure the basketball playing ability of college women. They found five tests that significantly correlated with the ratings by judges of players' performance in game situations: (1) the Edgren ball handling test, (2) the wall speed pass, (3) the free jump and reach, (4) the bounce and shoot, and (5) the moving target test. They believed that since the intercorrelations between the tests were low, different qualities of basketball were being measured. Young and Moser recommended substituting a game-like test that included the five test items. However, they did not design such a test themselves.

Cozens, Cubberly and Neilson (1937) presented a basketball game-like test that included the jump and reach, one minute goal shooting, push pass for speed and accuracy, pivot and pass, and the pivot and bounce for distance. No statistical measure was made to validate this test. Their recommendation was based on their empirical observations.

Schwartz (1937) constructed a test to measure improvement by using a pass and catch, throw for goal, pivot, bounce

and shoot, jump and reach, and a written knowledge test.

Glassow, Colvin, and Schwarz (1938) shortened the Young and Moser test to a three item battery including the bounce and shoot, speed pass, and the zone toss to be used as an objective measure of the basketball playing ability of college women. Recognizing the need to combine the accuracy score and the speed score in bounce and shoot, they devised a scoring plan that combined the accuracy score and the speed score to arrive at a single score for bounce and shoot. The accuracy score was arrived at by assigning a given number of points to an individual based on how many fractional standard deviations an individual was above or below the mean. For example, excellent accuracy was given a larger positive integer than was poor accuracy. The speed score was similarly scored, the only difference being that a fast time was given a larger positive integer than a slow time depending on how many fractional standard deviations the individual was from the mean. Violations such as double dribbling, traveling, and failing to start from behind a 24 foot restraining line were handled by adding additional time to the speed score. The final score for bounce and shoot was then derived by multiplying the two positive integers from the accuracy and speed tests. The correlation coefficient between this battery of tests and the coaches rating was .66.

Geltz (1939) faced the same problem as Glassow, Colvin, and

Schwarz (1938). It was difficult to combine into a single score a test in which a superior performance yields a high score (accuracy) and a second test in which a superior performance yielded a low score (speed). He designed schemes for combining speed and accuracy scores of dribbling and for dribbling with shooting. He made recommendations but did no statistical analysis.

Schwarz (1945) devised a battery of tests for high school girls that included the following items: bounce within a six foot area, jump and reach, pass and catch against a wall, accuracy throw for a goal, and pivot, bounce and throw for a goal. Statistical evidence for the validity was established by comparing the test scores to scores that were assigned to individuals by judges. It was suggested that the tests included could be slightly modified for use on the college level.

Know (1947) designed a test for high school or college varsity players composed of speed dribble, wall bound, dribble shoot, and the "penny cup" test. Reliability coefficients for the individual items ranged from .158 to .90. The total battery had a reliability of .88. The criterion for validation of the tests was the judges' scoring of the varsity players in actual games. At least four out of five varsity players finished among the top five on each test score.

Miller (1953) established norms based on percentile rankings

and T scores for the bounce and shoot test, the field goal speed test, and the push pass for accuracy. These three were chosen by Miller on the basis of Leilich's factor analysis study. Achievement scales were determined by classifying the raw scores of the bounce and shoot test into an accuracy classification and a time in seconds classification. Miller did not describe a method for combining accuracy and time into a single score. Subjects were college women majoring in physical education.

Stroup (1953) stated that the difficulty in devising a test that demonstrated high validity increased as the purpose for which the test is chosen broadened. He wanted an administratively economical test and used game results such as the number of turnovers, free throw percentage, field goal percentage, assists, and rebounds as the criterion for validating his basketball skill tests for college men. Stroup included goal shooting, wall passing, and dribbling in his test battery. Scoring was based on the number of passes completed, goals made, and obstacles passed while dribbling. Time for each test was one minute. He concluded that an average of the skill scores on the three individual items comprised a battery that was a valid measure of the player's basketball playing ability as related to the player's composite score based on the game results.

In 1962, Scott and French recommended two tests: the field

goal speed test, and a passing test that was a modification of the Edgren ball handling test. The validity coefficient for the field goal speed test was .60 when compared with a judges' rating of shooting ability. A reliability of .70 was obtained on the basis of repeated trials. The validity coefficient for the passing test was .51 when judges' ratings of ball handling ability were used as the criterion. If only one test was possible, they recommended use of the field goal speed test. Scott and French were critical of the bounce and shoot test. Although the test had "game-like" qualities, they claimed "the lack of pressure for speedy action characteristic of the game partly nullifies the possible value." (Scott and French: 1959, p. 164.) Since nothing prevents the player from pausing before attempting the shot the purpose of having the player do a pivot or bounce before shooting could be defeated.

Clarke (1967) described the Johnson basketball test as two battery tests for high school boys. One battery measured basketball ability by the field goal speed test, basketball throw for accuracy, and the dribble test. The second battery measured "potential" basketball playing ability by footwork, jump and reach, dodging run, and the Iowa Revision of the Brace test. The reliability coefficients for the ability tests was .89 and .93 for the potential basketball playing ability when compared to the judges' evaluation of the players.

In 1969, Lambert tested a revised version of the Glassow, Colvin,

and Schwarz test against the original test. (See the revised version in Appendix B.) The investigator came to four conclusions:

1. Shooting accuracy alone, as measured by the bounce and shoot test, was ineffective in rating college students' basketball playing ability.
2. A combination of twice time plus accuracy or time alone were the most valid and reliable methods for scoring the bounce and shoot test for either the original or the revised form of the test.
3. The revised version of the bounce and shoot test was a statistically reliable and valid, as well as administratively practical, measure of basketball playing ability.
4. The revised version of the bounce and shoot test with time and accuracy scores converted to T-scores and combined on the basis of twice time plus accuracy can be used for determining basketball playing ability of college women, (Lambert:69).

#### Summary

The review of literature shows that many attempts have been made at devising an acceptable basketball playing ability test. Most tests were devised when the rules of the game differed considerably from those rules now used. No single test has been found to be entirely

satisfactory.

Physical factors of height and weight have been shown to influence basketball playing ability. Certain elements of speed, dribble, accuracy, and jumping ability are recurrent considerations used to enhance the prediction and selection of basketball players. However, the accurate prediction of successful basketball playing ability remains a problem to be solved.

## Chapter 3

### PROCEDURES

#### Research Design

The eight skills tests used in this study had been recommended by Hopkins (1975 and 1979), Gaunt (1977), and Lambert (1969) as indicators of basketball ability (Appendices A-H). The coaches' ranking of their respective teams were used in order to correlate these skills tests to an evaluation of basketball playing ability. (Appendix I)

#### Data Collection

Data were collected in eight stations set up on September 25, 1979, for the 25 members of the Montana State University women's basketball team and on October 13, 1979, for the 18 members of the Bozeman High School girls' basketball team. The same administrators, test directions, and scoring sheets were used. The coaches ranked the players on their respective teams based on the previous week of scrimmage games. The players ranked their fellow players and themselves after they had completed the eight stations. One was considered the best, 2 second best and so on until all were ranked. The names of the players were placed on a sheet in random order so as to facilitate recalling names. (Appendix I)

Subjects were clothes in T-shirts, gym shorts, and basketball shoes normally worn for practice.

### Statistical Analysis

Correlation coefficients were calculated and used to make the following comparisons:

1. comparisons among the skills tests,
2. comparisons between each skill test and the coaches' ranking,
3. and the comparison between the coaches' ranking and the players' ranking.

The coaches' ranking for the Montana State University team was agreed upon by the head coach and the two assistant coaches in conference. Similarly, the Bozeman High School team was ranked by the head coach and her assistant in conference. This ranking took place after the coaches viewed their respective teams after a week of scrimmage games in which all the players participated and just before the eight skill tests were administered. The players' rankings were calculated by summing the individual's rankings for each player and then ranking these sums. These players' rankings were done after the eight skill tests were completed by the basketball players. (Appendix I)

The stepwise regression test was applied to the skill tests and the coaches' ranking in order to identify which skill test items most significantly predicted the coaches' ranking.

## Chapter 4

### RESULTS

The purpose of this study was to determine if any relationships existed (1) among the selected basketball skills tests, (2) between each skills tests and the coaches' ranking of the players, and (3) between a player's basketball playing ability as perceived by the coaches and by the players. Correlation coefficients were used to make comparisons between each of these relationships. The results of these comparisons are presented in tables in this chapter.

The skills tests are numbered as follows:

- I. Dribble
- II. Front Shot
- III. Field Goal Speed Test
- IV. Jump and Reach
- V. Broad Jump
- VI. Two-Directional Wall Pass
- VII. Speed Pass
- VIII. Lambert Speed and Accuracy Test.

#### Relationships Between the Basketball Skills Tests

Multiple correlation was done to determine if any relationships existed among the skills tests as shown in Table 1 and Table 2.

Table 1

Multiple Correlation Among the Basketball Skills Tests  
 Montana State University Women's Basketball Team (N = 25)

Skill Tests	II	III	IV	V	VI	VII	VIII
I Dribble	-.516*	.037	-.436*	-.206	-.426*	.386	.362
II Front Shot			.311	.416*	.396*	-.369	-.523*
III Field Goals Speed Test			.244	.118	.410*	-.373	-.276
IV Jump and Reach				.269	.287	-.573*	-.339
V Broad Jump					.132	-.471*	-.220
VI Two-Directional Wall Pass						-.688*	-.763*
VII Speed Pass							.511*
VIII Lambert Speed and Accuracy Test							

\*Significant correlation ( $P < .05$ ), critical value .390











































































