

MEASURES AFFECTING FREE-THROW SHOOTING  
IN BIG 12 CONFERENCE MEN'S  
BASKETBALL GAMES

By

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## DEDICATION

I dedicate this thesis to those who have provided me with outpouring support and encouragement. This includes many people, but primarily my family. I thank my mother and father, who have not only provided outstanding lives for my siblings and I, but who have also instilled in us the will to stare adversity in the eyes and the drive to overcome all obstacles. Because of them, I know my success transcends not only beyond the barriers of my culture, but also into the depths of mainstream society. The confidence and swagger I carry with me everyday are attributes of their continuous guidance and support. I know that no matter how far apart we are, they will always be by my side. I also know that their pride is generated not from the times that I excel, but from my perseverance and dedication *to* excel. I only hope I make them nearly as proud of me as I am to be their son.

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well as tremendous support and encouragement. He *is* my brother, but he is also my mentor and best friend as well.

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## TABLE OF CONTENTS

Chapter	Page
Approval Page.....	ii
Dedication.....	iii
Acknowledgements.....	v
List of Tables and Figures.....	viii
I. INTRODUCTION.....	1
Statement of the Problem.....	3
Hypotheses.....	3
Purpose of the Study.....	4
Definition of Terms.....	5
Significance of the Study.....	7
Assumptions.....	9
Delimitations.....	9
Limitations.....	10
Organization of the Study.....	11
II. REVIEW OF LITERATURE.....	13
Introduction.....	13
Controlled Experiments.....	13
Game-Setting.....	14
Archival Studies.....	15
Summary of the Literature Review.....	15
III. METHODOLOGY.....	17
Subjects.....	17
Instrumentation.....	18
Research Design.....	19
Procedures.....	20

Chapter	Page
IV. RESULTS AND DISCUSSION.....	21
Introduction .....	21
Analysis of Data .....	21
Discussion of the Results .....	24
V. SUMMARY OF FINDINGS, RECOMMENDATIONS, AND CONCLUSIONS... 31	
Summary of Findings .....	31
Recommendations .....	34
Conclusions .....	35
REFERENCES .....	37
VITA	
ABSTRACT	

## LIST OF TABLES AND FIGURES

### Tables

Table	Page
1. Universities of the Big 12 Conference and their locations .....	5
2. Standings of the 2006 Big 12 Conference men's basketball season.....	7
3. The teams of the two Big 12 Conference divisions .....	11
4. Identification numbers for each Big 12 Conference team .....	22
5. Visiting teams' free-throw percentages at Big Conference schools .....	26
6. Road free-throw percentages among Big 12 Conference teams .....	28
7. Percentage of final-minute points from free-throws .....	29
8. Road free-throw percentages by experience level .....	30
9. Average level of experience per team.....	34

### Figures

Figure	Page
1. Hypothetical schedule for two Big 12 Conference teams.....	11
2. Example of a box score.....	18
3. Example of play-by-play summary.....	19
4. Example of the categories for data entries .....	23
5. Example of final-minute scoring summary.....	24

## CHAPTER I

### INTRODUCTION

#### College Basketball Nation

College basketball has become a way of life on campuses across America. According to the National Collegiate Athletic Association [NCAA (2005)], over 40 million spectators attend collegiate basketball games annually, making the sport the most attended event in intercollegiate athletics. Over 20 million fans attend men's Division I games alone (NCAA, 2005). Some just enjoy watching some of the country's most talented athletes compete at the highest levels of intercollegiate competition, while others are simply fans of their respective schools. However, for extreme spectators, college basketball is a chance to express their allegiance for their team; they do anything and everything to make their team victorious.

The desire to be the loudest, rowdiest, most distracting fans to opposing teams has led to the emergence of distinct identities among schools' fans. A few examples of these identities include the *Rock Chalk Jayhawkers* at the University of Kansas, the *Orange Krush* at the University of Illinois, the *eRUPPtion Zone* at the University of Kentucky, the *Rowdy Reptiles* at the University of Florida, and the *Dawg Pack* at the University of Washington. Although each school's fans exhibit a certain distinction among the rest, Duke University's *Cameron Crazyies* has been credited with the initiation of this craze

with camp outs before games and uniform dress and synchronized chants during games, all traditions that have been duplicated at many campuses across the country (Sports Illustrated, 2006).

One of the most common traditions and accepted practices at college basketball games is distracting opposing players who are attempting to shoot free-throws (McGowen, 1987). Many student seating areas are strategically placed in sections directly behind the goals, so that when a member of the opposing team shoots free-throws, he would be staring into the heart of obnoxious students who are creating distracting movements and ear-piecing noises. These situations can be so loud that conversation is possible only from within inches (McGowen, 1987). This attempt to deter the focus and concentration of opposing players creates intimidating environments at venues across the country, some more so than others. Since studies have shown that loud crowd noise negatively affects visiting team performance (McGowen, 1987), it gives the home team a “home court advantage.”

Making free-throws can have a meaningful impact on the outcomes of games. In fact, free-throws make up 20 to 25% of all points scored in games, 35% of all points scored in the last 5 minutes, and two-thirds of points scored by winning teams in the final minute (Kozar, Vaughn, Whitefield, Lord and Dye, 1994). Many coaches agree that free-throw success is often the deciding factor between winning and losing, which supports Jenkins (1977) study that in close contests the team that had the higher free-throw percentage won 80% of games (cited in Kozar, 1995). Even though teams spend countless hours practicing free-throws along with other aspects of the game, coaches still would argue that players tend to make a lower percentage of free-throw attempts in

games than in practice and that home teams make a higher percentage of free-throws than visiting teams (Kozar, Vaughn, Whitefield, Lord and Dye, 1995).

### **Statement of the Problem**

The problem of this study was to determine measures affecting free-throw shooting in basketball games, especially those shot by visiting teams. There are numerous tactics home crowds use to distract opposing players while they are shooting free-throws. Visually, these range from organized (e.g. synchronized swaying or jumping) or random movement (e.g. each crowd member creating his/her own movement) to the use of objects (e.g. balloons, posters, costumes, etc.). Aurally, distractions may range from verbal chants or screaming to stomping, clapping, or sounds from the band. Another factor that could have an impact on opposing free-throw shooters on the road is the unfamiliar surroundings of playing in a different arena, one in which these players are not accustomed to. By calculating home and away free-throw percentages for all teams, this study investigated if shooting on the road actually does have a negative impact on visiting players.

### **Hypotheses**

Upon completion of statistical analysis of data collected from box scores and play-by-play summaries during all 2006 Big 12 Conference men's basketball games, evidence was expected to support four hypotheses.

1. The conference champion will be the school where opposing teams collectively made the lowest percentage of free-throws. In other words,

teams shot poorer at the conference champion's venue than at any other school. This would indicate that opposing shooters were more distracted there than at any other school, thus allowing the conference champion to score more points from free-throws and eventually win more games.

2. The conference champion will be the team with the highest road free-throw percentage. This would indicate that it overcame distractions more so than all the other teams, enabling it to win vital away games that proved pivotal in the standings.
3. The team with the highest percentage of points scored from free-throws in the final minute will be the conference champion. This was an attempt to support Kozar et al.'s (1994) study that more than two-thirds of points scored by the winning team in the final minute were free-throws.
4. Players with the most experience at the collegiate level will have higher road free-throw percentages than players with less collegiate experience. This would indicate that the more collegiate experience a player has, the easier it is for him to overcome the pressures and distractions while shooting free-throws away from home.

### **Purpose of the Study**

The purpose of this research was to study the relationship between Big 12 Conference teams' home and away free-throw percentages at different levels of games and their overall success in terms of the final standings of the 2006 conference basketball season. Also, the relationship between players' experience level and their respective

free-throw success was examined. And lastly, teams' free-throw percentages in the final five minutes and one minute of games and their impacts on the outcomes of games were investigated.

### Definition of Terms

Away Game: a game that is played at the opposition's home venue; also referred to as *on the road*

Big 12 Conference: the alliance of twelve universities that compete against each other for a championship. Each championship helps to determine teams and/or individuals that will represent the Conference in national postseason competition (Big 12 Conference website). Table 1 shows the twelve universities of the Big 12 Conference and their locations.

Table 1. Universities of the Big 12 Conference and their locations.

<u>School</u>	<u>Location</u>
Baylor University	Waco, Texas
Colorado, the University of	Boulder, Colorado
Iowa State University	Ames, Iowa
Kansas, the University of	Lawrence, Kansas
Kansas State University	Manhattan, Kansas
Missouri, the University of	Columbia, Missouri
Nebraska, the University of	Lincoln, Nebraska
Oklahoma, the University of	Norman, Oklahoma
Oklahoma State University	Stillwater, Oklahoma
Texas, the University of	Austin, Texas
Texas A&M University	College Station, Texas
Texas Tech University	Lubbock, Texas

(Big 12 Conference website, 2006)

Box Score: a printed summary of a game in the form of a table that lists the players of both teams and their individual performance according to all statistical categories (Answers.com, 2006).

Close Game: any game in which the difference of score between both teams is nine points or less (Kozar, 1995)

Experience Level: the number of years that a player has played in intercollegiate competition; possibilities include:

1<sup>st</sup> year player = freshman

2<sup>nd</sup> year player = sophomore

3<sup>rd</sup> year player = junior

4<sup>th</sup> year player = senior

Expert Shooter: a player who makes at least 75% of free-throws attempted (Vickers, 1996)

Field Goal: a shot taken or made that is not a free-throw; includes dunks, jump shots, lay-ups, and three-pointers

Free-throw: a privilege given to a player who has been fouled while attempting a shot or when the fouling team has committed at least the limit of seven fouls in one half of play (Kozar, Whitefield, Lord, and Dye, 1994); the player shoots an uncontested shot from the foul-line, which is 15 feet from the goal; the goal is ten feet high (Vickers 1996 & NCAA, 2005)

Free-throw Percentage: the mathematical calculation of the number of free-throws made divided by the number of free-throws attempted; the product is then multiplied by 100 (Oxford University Press, 1981)

Home Game: a game that is played at a team's home venue; also referred to as *at home*

Play-by-play Summary: a detailed running account of the action during the game that presents the exact time at which certain events occur, such as the time when points are scored, when fouls are committed, and when time is stopped.

Standings: the order in which the teams of the Big 12 Conference stand with regards to their number of wins and losses; the team with the most wins (and thus the least amount of losses) at the end of the season is the champion. Table 2 shows the standings of the 2006 Big 12 Conference men's basketball season.

Table 2. Standings of the 2006 Big 12 Conference men's basketball season.

<u>Team</u>	<u>Wins-Losses</u>
Texas	13-3
Kansas	13-3
Oklahoma	11-5
Texas A&M	10-6
Colorado	9-7
Nebraska	7-9
Oklahoma State	6-10
Texas Tech	6-10
Kansas State	6-10
Iowa State	6-10
Missouri	5-11
Baylor	4-12

(Big 12 Conference website, 2006)

### **Significance of the Study**

This study was significant in several ways. Hopefully, first of all, it demonstrated the importance of making free-throws to win games. As mentioned previously, Kozar et al. (1994) calculated that free-throws make up to 25% of all points scored in games. This means that teams must either make a high percentage of free-throws, which are uncontested, or make a high percentage of field goal attempts, which are contested and

shot with more rapid and less accurate movement, in order to win games. Now on the average, even teams with the highest field goal percentages in the nation only make about 50% of free-throw attempts (NCAA, 2006). Further, the mean free-throw percentage is close to 70% (Kozar, 1995) with the highest in 2006 being 79.9% (NCAA, 2006). Therefore, it is obvious that making a high percentage of free-throws should give a team a chance to win games. Second, this study should have demonstrated a relationship between experience level and free-throw percentage. McGowen (1987) concluded from his study that subjects who have participated at the varsity level (of any sport) have had the experience of performing in front of large crowds and have had to overcome the effects of pressure created by loud noises to be successful at a given task. Playing in Big 12 Conference games means that players could be playing in front up to 16,000 fans; this can become intimidating for visiting teams. The players on the visiting team who have difficulty overcoming this adversity may tend to miss free-throws otherwise made in less adverse situations. If the statistics support this claim, then perhaps coaches have the need to develop strategies that allow the players who are able to overcome the adverse situations more opportunities to shoot free-throws, and thus give their team more of a chance to win. Also, coaches could solve this problem by creating high-pressure situations in practice that would allow the distractible players to strengthen their concentration skills. Lastly, since Kozar et al. (1994) noted that 35% of points scored in the final five minutes and two-thirds of points scored in the final minute by winning teams are free-throws, this study investigated how many games are actually decided by free-throws in the final minutes. If a high prevalence exists, then understandably,

coaches would need to stress to players the importance of making free-throws especially during the final segments of the games.

### **Assumptions**

McGowen (1987) used different sound levels (57, 72, and 90 decibels) of pre-recorded crowd noise to manipulate differences in anxiety levels among his subjects, and Wang, Marchant, Morris and Gibbs (2004) used performance contingent rewards, an audience, and a video recorder to create pressure situations for their subjects. The measure of specific crowd distractions in this study, however, was not entirely feasible, so it must be assumed that all home crowds create at least some form of distraction for opposing free-throw shooters.

### **Delimitations**

This study was delimited to the following:

1. Males who played for Big 12 Conference teams and who attempted at least one free-throw during a game versus another Conference team.
2. Players who played during the 2006 Conference season.
3. Every free-throw attempted during Big 12 Conference games, which were then sorted into the following three sub categories:
  - a. Free-throws attempted in the final five minutes
  - b. Free-throws attempted during close games
  - c. Free-throws attempted in the final five minutes of close games.

## **Limitations**

Although this study examined free-throw shooting in Big 12 Conference games, especially road free-throw percentages, it must be known that although all teams play each other at least once, teams do not actually travel to all Big 12 Conference venues during the course of one season. The conference is split into two, six-team divisions, the North and the South. Teams in one division play all the teams in their respective division twice, at home and away, while playing teams from the other division only once, three at home and three on the road. Therefore, even though every team plays the same amount of games at home (8) and on the road (8), they do not all play at the same road venues as everyone else. For example, two teams from the South division, say Texas and Oklahoma, will play each other and the other four teams from the South division twice, both at home and away (5 home games and 5 away games). They will also play all six teams from the North division once, three at home and three away (totaling 8 home games and 8 away games). However, scheduling may dictate that Texas plays Nebraska, Colorado, and Missouri at home, while Oklahoma plays those same schools on the road. Therefore, there is a possibility that a team may not have to travel to a school or schools that are considered to have the most intimidating crowds when another team in the same division might. So results from this study may not be as valid as they would have been had every team had the opportunity to play every school both at home and on the road. This hypothetical scenario is seen in Figure 1. Table 3 shows the teams representing the two divisions of the Big 12 Conference.

Figure 1. Hypothetical scheduling for two Big 12 Conference teams.

<u>Texas Home Games</u>	<u>Texas Road Games</u>	<u>Oklahoma Home Games</u>	<u>Oklahoma Road Games</u>
vs. Baylor	at Baylor	vs. Baylor	at Baylor
vs. Oklahoma	at Oklahoma	vs. Texas	at Texas
vs. Oklahoma State	at Oklahoma State	vs. Oklahoma State	at Oklahoma State
vs. Texas A&M	at Texas A&M	vs. Texas A&M	at Texas A&M
vs. Texas Tech	at Texas Tech	vs. Texas Tech	at Texas Tech
vs. Nebraska	at Kansas	vs. Kansas	at Nebraska
vs. Colorado	at Kansas State	vs. Kansas State	at Colorado
vs. Missouri	at Iowa State	vs. Iowa State	at Missouri

vs. - versus  
at - on the road

Table 3. The teams of the two divisions of the Big 12 Conference.

<u>North Division</u>	<u>South Division</u>
Colorado	Baylor
Iowa State	Oklahoma
Kansas	Oklahoma State
Kansas State	Texas
Missouri	Texas A&M
Nebraska	Texas Tech

(Big 12 Conference website, 2006)

### **Organization of the Study**

This thesis consists of five main components: the introduction section, the review of literature section, the methodology section, the results and discussion section, and the summary of findings, recommendations, and conclusion section. In the introduction section, background information of the problem is presented, as well as the statement of the problem and the purpose of the study. Also addressed are the definition of terms, the significance of the study, assumptions and limitations, and the study's hypotheses. The next section, the review of the literature, presents previously conducted studies that are relevant to this present study. These studies serve as bases for this study's hypotheses.

The methodology section introduces the subjects and the instrumentation that is used to measure data. Also in this section, the research design and procedures that are used to collect data are discussed. The results and discussion section explains the findings of the study. Also discussed in this section is how data was analyzed and used to support or not support the hypotheses. The final section examines how this study can contribute to basketball teams' success. Also, suggestions and recommendations for future studies are given. A list of references used to gather information for this research follows the content of the study.

## **CHAPTER II**

### **REVIEW OF LITERATURE**

#### **Introduction**

In this section of the thesis, review of literature discussing free-throw shooting is presented. The purpose of the review is to familiarize the reader with the conditions that basketball players must overcome while shooting free-throws, although such shots are uncontested. Several controlled studies are presented wherein researchers have manipulated an environmental independent variable to determine the effect on the dependent variable, shooting success. And finally, studies that analyzed archival data are presented.

#### **Controlled Experiments**

Wang et al. (2004) conducted a study with 66 subjects who shot the same number of free-throws in low pressure and high pressure conditions. In the low-pressure conditions, only the researcher was present simply to record the number of makes and misses. The high-pressure condition included financial rewards, a non-distracting audience, and a video recorder that recorded every shot the subject took. The researchers concluded that the manipulation of the high-pressure condition caused an overall decline in performance.

Another study that manipulated a high-pressure condition was McGowen's (1987) dissertation on the effects of sound pressure levels on the free-throw shooting of

experienced and non-experienced basketball players. In this study, subjects shot free-throws while pre-recorded crowd noise was played over the gymnasium speakers at three different sound levels (57, 72, and 90 decibels). He concluded that high sound pressure levels were associated with negative changes in performance, but had a milder affect on experienced players than on non-experienced players.

Dunn and Wozniak's (1988) study tested the social facilitation theory by arguing that the presence of others would increase the performance level of those who are good at a task, while decreasing the performance level of those who are poor at that same task. Subjects shot free-throws during two different situations, one while they were alone and the other while they were in a game-simulated setting. Results concluded that all subjects made a lower percentage of free-throws in the game-setting situation than they did when they were alone.

### **Game-Setting Experiment**

Zengerle (2005) gave fans inflatable balloons to wave around during opposing free-throws at a National Basketball Association game. He directed the crowd to create two situations: one, to move randomly and two, to move in unison. He reported that an illusion that the goal was actually moving was created when the fans moved in unison. This disrupted shooters more than when fans the moved at random, which caused movement to be undifferentiated, thus having no affect on the players.

## **Archival Studies**

Kozar (1995) collected archival data from two collegiate basketball seasons, calculated free-throws percentages by players in those games (both home and away), and compared them to practice free-throw percentages. He concluded that players had higher practice percentages due to the higher number of free-throw attempts in succession, 7.53 on the average, compared to game situations when players shoot only one or two at a time. This higher number of attempts in succession, he discussed, allows the player to get “into a rhythm.” Game situations do not allow players to get into that rhythm. He also found that free-throw shooting at home was higher than free-throw shooting on the road but gave no explanation as to why that occurred.

Kozar, Vaughn, Whitefield, Lord, and Dye (1994) analyzed play-by-play records of nearly 500 collegiate basketball games and found that over 20% of points scored were from free-throws, 35% of points scored in the final 5 minutes were free-throws, and that more than two-thirds of points scored by the winning team in the final minute were free-throws. Also, they found that winning teams scored a significantly higher percentage of their points from free-throws than losing teams.

## **Summary of the Literature Review**

Each of the previously discussed studies revealed pertinent information that served as the basis of this current study. The controlled experiments exhibited how manipulation of independent variables (rewards, differing levels of crowd noise, audiences, etc.) influenced the dependent variable (free-throw shooting). Since no physical alterations were made to the shooters, then the effects must have been

psychological in nature. The game-setting experiment was the only study that used manipulation in an actual game. The crowd distractions, although not physical in nature, caused free-throw shooters to miss more free-throws. Again, this indicates that environmental effects must be psychological in nature. And finally, the archival studies provided statistics for comparison purposes. Since this study was not measuring actual crowd distraction and only utilizing home and away games, and different segments of those games, as the independent variables, the most notable numbers provided were those that emphasized the comparison of free-throw percentages for teams during home and away games and during the final five minutes and final one minute of those games and their correlation to the Conference's final standings.

## **CHAPTER III**

### **METHODOLOGY**

#### **Introduction**

The methodology section of this thesis is divided into four parts:

- 1) Subjects and how they were acquired are described.
- 2) Description of instrumentation and how data was collected.
- 3) The research design.
- 4) Procedures used to conduct the study.

#### **Subjects**

During the 2005-06 basketball season, 4,281 players participated in NCAA men's Division I basketball games (NCAA, 2006). According to ESPN.com (2006), there are 334 men's basketball teams that compete in 32 conferences in Division I. Since it was immensely infeasible to collect data from every player, on every team, from every conference in America, this study focused only on players from teams within the Big 12 Conference. The primary reason this conference was chosen for this study is due to the ties that the school at which this study is being conducted (Oklahoma State University) has with it. As mentioned previously, Oklahoma State is a member institution of the Big 12 Conference. Another reason this conference was chosen was due

to the fact that data is easily accessed from each schools website and also the Big 12 Conference website.

During the 2006 season, 96 games were played (Big 12 Conference website, 2006) and data was collected from each game played using box scores and play-by-play summaries. This study recorded the site of each game, making note of the home and away teams. Free-throw statistics on all 136 players who participated were used, noting their free-throw records. These were then consolidated according to respective teams to determine free-throw percentages for teams in the following situations: free-throws at home versus on-the road, free-throw percentages in the final five-minutes and final one-minute, and the percentage of total points scored that are free-throws. Furthermore, these situations were analyzed according to players' collegiate level of experience.

### Instrumentation

The instruments used in this study were box scores and play-by-play summaries of all 96 games played during the 2006 Big 12 Conference season. Both contain accurate records of games and are valid and reliable. Figure 2 provides an example of a box score.

Figure 2. Example of a box score.

TEAM:													
##	Player Name	FG-FGA	FG-FGA	FT-FTA	OF	DE	TOT	PF	TP	A	TO	BLK	S MIN
		5-11	0-2	<b>6-7</b>	1	5	6	1	16	1	1	1	0 32
		1-1	0-0	<b>0-0</b>	2	1	3	2	2	0	2	0	0 12
		3-8	2-5	<b>0-0</b>	0	3	3	2	8	3	2	0	2 26
		3-7	1-3	<b>1-2</b>	2	1	3	3	8	1	5	0	2 23
		3-8	2-5	<b>0-0</b>	0	1	1	0	8	4	2	0	3 35
		2-3	1-2	<b>0-0</b>	1	2	3	1	5	0	3	1	0 19
		2-3	0-0	<b>2-5</b>	2	3	5	5	6	2	1	0	1 27
		2-4	0-0	<b>2-2</b>	2	4	6	1	6	0	5	1	0 21
		0-0	0-0	<b>0-1</b>	0	1	1	1	0	0	1	0	0 4
		0-0	0-0	<b>0-0</b>	0	0	0	0	0	0	0	0	0 1
Totals		21-45	6-17	<b>11-17</b>	10	27	37	16	59	11	22	3	8 200

FT: free-throws made    FTA: free-throws attempted

For this study, only the bolded portion is used.

Figure 3 provides an example of a play-by-play summary (only the first minute of the game is presented in figure 3).

*Figure 3. Example of a play-by-play summary.*

1st PERIOD Play-by-Play			
HOME TEAM:	TIME	SCORE	VISITORS:
-----			
	19:37	0-0	FOUL by
	19:37	0-0	TURNOVR by
MADE JUMPER by:	19:13	2-0	
FOUL by	19:11	0-0	
	19:11	0-0	SUB IN:
	19:11	0-0	SUB OUT:
	<b>18:53</b>	<b>2-1</b>	<b>MADE FREE-THROW</b>

Again, for this study, only bolded sections were used. Both of these instruments were substantial enough to gather data needed for this study and thus provided valid and reliable results that either supported or did not support the study's hypotheses.

### Research Design

The design of this study was quantitative in nature with a descriptive approach. Archival data from Big 12 Conference men's basketball games was analyzed. The design was appropriate since players spend countless hours practicing free-throws (Kozar et al., 1995), yet some teams are still better free-throw shooters than others. This study investigated how much influence high free-throw percentages in certain situations have on the outcomes of games.

## **Procedures**

Data collection was conducted by utilizing box scores and play-by-play summaries of all Big 12 Conference men's basketball games. Members of each team and their experience levels were first recorded. Then each player's free-throw attempts and makes from each game played were recorded, which were then compiled to calculate teams' home, away, and overall free-throw percentages during the conference season. This analysis of data allows for the investigation of several independent variables. First, teams' overall free-throw percentages at both home and away was studied. Next, free-throw percentages during the final five-minutes and one-minute of games were examined. Then, the percentage of total points scored by teams that are free-throws was investigated. And finally, free-throw percentages according to experience level were studied.

## **CHAPTER IV**

### **RESULTS AND DISCUSSION**

#### **Introduction**

The problem of this study was to determine measures affecting free-throw shooting in basketball games, especially those shot by visiting teams. There are numerous tactics, both visually and aurally, that home crowds use to distract opposing players while they are shooting free-throws. Another factor that could have an impact on opposing free-throw shooters on the road is the unfamiliar surroundings of playing in a different arena, one in which these players are not accustomed to. Although this study did not investigate the actual means that may have affected visiting free-throw shooters, it did investigate if shooting on the road actually does have a negative impact on visiting players. This chapter was divided into the following: 1) Analysis of Data and 2) Discussion of the results.

#### **Analysis of Data**

Box scores and play-by-play summaries from all 96 Big 12 Conference men's basketball games during the 2006 season were collected and reviewed. Each free throw shot at any portion of a game was recorded and inputted into an electronic spreadsheet. The spreadsheet was sectioned into columns with the first two columns serving to

identify the players on each team and their respective level of experience. The first two numbers of the players' identification number (ID#) identified the school he played for, as seen in Table 4.

*Table 4.* Identification numbers for each Big 12 Conference team.

01	Baylor	07	Nebraska
02	Colorado	08	Oklahoma
03	Iowa State	09	Oklahoma State
04	Kansas	10	Texas
05	Kansas State	11	Texas A&M
06	Missouri	12	Texas Tech

The final two numbers identify the player according to the alphabetical order of his last name with regards to all players on that particular team. For example, if a player's ID# was 0901, this meant that he played for team 09 (Oklahoma State) and he was the first player listed on his teams roster according to last name.

The remaining columns were sectioned into four categories: 1) overall – meaning at any portion of the game, 2) final 5 minutes – meaning the free-throws that were shot during the final five minutes of games, 3) close game – meaning free-throws that were shot when the score differential was nine points or less, as defined by Kozar (1995), and 4) close games in the final five minutes – meaning free-throws shot in the final five minutes of games when the score differential was nine points or less. So according to the definition of the categories, one free-throw shot was inputted into at least the overall category, but it is possible that that one shot may have been inputted into one, two, or all three of the other categories as well. Figure 4 provides an example of the categories used to record all free-throw shots. Each player's shot was inputted into the appropriate category. For instance, player #1108 attempted and made two free-throws at some point

in the game. Since his two free-throws were entered in the overall and close game categories, this means he shot free-throws in a close game but not in the final five minutes.

Figure 4. Example of categories for data entries.

Player ID#	Year	Game		Final 5 Minutes		Close Game		Close Game (Final 5 Minutes)	
		FTM	FTA	FTM	FTA	FTM	FTA	FTM	FTA
1101	1								
1102	1	4	4	2	2	4	4	2	2
1103	2	3	7	1	2	3	7	1	2
1105	2	2	2	2	2	2	2	2	2
1110	2								
1104	3								
1106	3	4	5	2	3	4	5	2	3
1107	3	2	4			2	4		
1108	4	2	2			2	2		
1109	4	0	1	0	1	0	1	0	1

FTM: Free-throws made  
FTA: Free-throws attempted

A running total of free-throws shot and made as well as free-throw percentages were generated as data was entered into the spreadsheet. These numbers were used to test the study's hypotheses.

After all data was entered, play-by-play summaries were re-reviewed to analyze points scored by each team in the final minute of all games and the number of free-throws that contributed to those points. A running total of last minute points scored and free-throws made as well as the percentage of final minute free-throws contributing to final minute points were generated. These numbers were also used test the study's hypotheses. Figure 5 shows an example of the data inputted for each team's final minutes points scored and final minute free-throws.

Figure 5. Example of final-minute scoring summary.

	vs. Baylor (at home)	
	Points	FT
Baylor	-	-
Colorado	5	2
Kansas	0	0
Kansas State		
Missouri		
Nebraska	2	2
Oklahoma	2	0
Oklahoma State	6	4
Texas	3	1
Texas A&M	4	4
Texas Tech	2	0

### Discussion of the Results

Throughout the 2006 Big 12 Conference men's basketball season, 3,719 free-throws were attempted, with 2,615 of them being successfully made, giving the Conference as a whole a success rate of 70.31%. There were 2,008 free-throws attempted by home teams with 1,423 of them being successfully made (70.87% success by home teams). Road teams attempted 1,711 free-throws, while making 1,192 of them (69.67% success by road teams). Although home teams did shoot just over one percent more successfully than road teams, results indicated that shooting free-throws on the road, away from the familiar confines of each team's home venue and in perceived hostile environments created by home teams' fans, was not drastically affected.

Further analysis of the data was used to test the study's four hypotheses. Measures supporting or not supporting the hypotheses are presented below.

*Hypothesis #1: The conference champion will be the school where opposing teams collectively made the lowest percentage of free-throws.*

This hypothesis was only partly supported. Since two teams, Texas and Kansas, claimed the highest win total among Conference teams during the 2006 season 13, both

teams were examined. Texas did defeat Kansas in the single head-to-head meeting between the schools and was thus designated Conference champion, but for the purpose of this study, only the number of wins was taken into consideration in examining data to Conference standings.

Big 12 Conference teams who visited Kansas successfully made 57.50% of free-throws attempted, which was the lowest free-throw percentage among the collection of teams who visited any Conference venue. Furthermore, visiting team shot the lowest free-throw percentages in close games and in the final five minutes of games at Kansas as well. These findings support hypothesis #1, indicating that teams who shot free-throws at Kansas may have perceived increased pressure knowing that making free-throws may be more essential to winnings games at Kansas than against any other opponent at their respective venue.

The same support was not seen when analyzing free-throw percentages among teams who played at Texas. These teams successfully made 67.59% of free-throws attempted, which was the fifth lowest free-throw percentage among teams visiting Conference venues. The collection of teams visiting Texas also shot more successfully than some teams shooting at other venues in the other categories as well. These statistics do not support hypothesis #1. One possible explanation as to why this occurred may be because Texas never played a close game at home. Albeit visiting teams did shoot free-throws in close games while playing at Texas, not one team shot free-throws in close games in the final five minutes. This shows that the free-throws shot in close games must have been during the early segments of games, before Texas began increasing the point differential in its favor. Therefore, as the point differential increased, the visiting teams'

perceived pressure while shooting free-throws at Texas may have decreased, allowing them to make a higher percentage of free-throws. These results may also present an underlying explanation as to why Texas defeated Kansas in their lone meeting, which was played at Texas. Table 5 shows teams' free-throw percentages at all Conference venues.

Table 5. Visiting teams' free-throw percentages at Big 12 Conference schools.

Game		Final 5 Minutes	
at Kansas	57.50%	at Kansas	60.00%
at Iowa State	66.29%	at Missouri	66.67%
at Colorado	66.67%	at Texas A&M	68.29%
at Baylor	67.55%	at Iowa State	69.49%
at Texas	67.59%	at Texas	69.57%
at Texas A&M	70.18%	at Oklahoma	69.77%
at Kansas State	70.20%	at Baylor	70.97%
at Nebraska	71.07%	at Kansas State	71.43%
at Missouri	71.31%	at Oklahoma State	71.43%
at Oklahoma	73.19%	at Colorado	73.91%
at Oklahoma State	75.14%	at Texas Tech	82.14%
at Texas Tech	77.69%	at Nebraska	84.21%

Close Game		Close Game (Final 5 Minutes)	
at Kansas	51.43%	at Colorado	58.33%
at Baylor	64.15%	at Kansas	60.00%
at Colorado	65.71%	at Missouri	61.54%
at Iowa State	65.81%	at Nebraska	62.50%
at Missouri	67.62%	at Iowa State	66.67%
at Kansas State	70.19%	at Kansas State	66.67%
at Nebraska	70.21%	at Texas A&M	68.75%
at Oklahoma	70.53%	at Oklahoma	70.00%
at Texas A&M	70.71%	at Oklahoma State	70.00%
at Texas	72.00%	at Baylor	77.78%
at Oklahoma State	74.05%	at Texas Tech	85.71%
at Texas Tech	78.95%	at Texas	-

*Hypothesis #2: The conference champion will be the team with the highest road free-throw percentage.*

This hypothesis was not supported. Although Kansas ranked in at least the top four in each of the categories, it never had *the* top road free-throw percentage in any of the categories. Its 72.14% overall road free-throw success rate was third among Big 12 Conference schools. Texas did not rank higher than sixth in any of the categories. Its overall road free-throw percentage was 67.59%. Oklahoma State, who only had six wins and finished tied for seventh place in the standings, had the highest road free-throw percentage at 77.05%. The last place team, Baylor, shot the second highest free-throw percentage among Big 12 Conference schools at 74.19%. None of these statistics support hypothesis #2. The closest claim to this hypothesis is that Kansas ranked in the top four in each of the categories, but still did not have the highest percentage of road free-throws in any of the categories. Table 6 shows road free-throw percentages among Big 12 teams.

*Hypothesis #3: The team with the highest percentage of points scored from free-throws in the final minute will be the conference champion.*

Statistical analysis does, in part, support this statement. Again, this study must examine two teams, Texas and Kansas, since both tied for the most wins during the 2006 conference season. With free-throws contributing to 83.87% of points scored in the final one-minute of games on the road and 57.78% of all final one-minute points, Kansas ranks first in both these categories. Kansas, however, ranked last in percentage of free-throws contributing to the final one-minute of home games because none of its final one-minute points were scored from free-throws. Nonetheless, Kozar et al.'s (1994) study is supported, even though Kansas' overall percentage of final one-minute free throws

Table 6. Road free-throw percentages among Big 12 Conference teams.

Game		Final 5 Minutes	
Oklahoma State	77.05%	Missouri	91.67%
Baylor	74.79%	Baylor	80.00%
Kansas	72.14%	Oklahoma State	77.14%
Iowa State	71.63%	Kansas	76.25%
Texas Tech	71.32%	Nebraska	75.56%
Texas	70.77%	Oklahoma	70.00%
Nebraska	69.77%	Kansas State	68.75%
Kansas State	68.09%	Texas Tech	66.67%
Missouri	67.97%	Texas A&M	65.79%
Oklahoma	65.91%	Texas	62.50%
Texas A&M	64.60%	Iowa State	60.00%
Colorado	62.50%	Colorado	58.06%

Close Game		Close Game (Final 5 Minutes)	
Oklahoma State	83.72%	Missouri	90.00%
Baylor	77.78%	Oklahoma State	88.00%
Kansas	73.68%	Kansas	78.57%
Missouri	70.42%	Texas Tech	78.57%
Kansas State	70.37%	Baylor	75.00%
Nebraska	67.96%	Nebraska	73.08%
Texas Tech	67.82%	Oklahoma	68.18%
Texas	67.09%	Texas A&M	64.52%
Iowa State	66.67%	Kansas State	64.29%
Oklahoma	65.66%	Texas	57.14%
Colorado	63.83%	Colorado	44.44%
Texas A&M	60.06%	Iowa State	40.00%

contributing to the points scored in the final minute falls below the two-thirds that Kozar et al. claimed. Had free-throws contributed to the total of final minute points scored in games, than its overall percentage would have been greater.

Texas, on the other hand, did not exhibit the same trend. Overall, 41.18% of its final minute points were free-throws, with 50% prevalence at home and 33.33% on the road. This data does not support hypothesis #3. As previously mentioned, Texas did not play in any close games at home. This leads to the possibility that similar scenarios may have occurred on the road as well. If this was the case, then Texas would have had very

few opportunities to make free-throws in the final minute of games. Table 7 shows the percentage of free-throws contributing to final minute points scored by all Big 12 Conference teams at home, on the road, and overall.

Table 7. Percentage of final-minute points from free-throws.

at HOME		AWAY		OVERALL	
Missouri	71.43%	Kansas	83.87%	Kansas	57.78%
Kansas State	70.00%	Texas A&M	54.17%	Nebraska	48.57%
Colorado	69.57%	Nebraska	53.33%	Kansas State	48.48%
Texas	50.00%	Iowa State	47.06%	Texas A&M	47.17%
Oklahoma State	47.37%	Texas Tech	35.71%	Colorado	43.59%
Texas Tech	46.67%	Oklahoma State	35.29%	Iowa State	42.86%
Nebraska	45.00%	Texas	33.33%	Oklahoma State	41.67%
Baylor	44.44%	Baylor	25.00%	Missouri	41.18%
Texas A&M	41.38%	Oklahoma	25.00%	Texas	41.18%
Oklahoma	40.74%	Missouri	20.00%	Texas Tech	39.53%
Iowa State	40.00%	Kansas State	15.38%	Oklahoma	33.33%
Kansas	0.00%	Colorado	6.25%	Baylor	32.61%

*Hypothesis #4: Players with the most experience at the collegiate level will have higher road free-throw percentages than players with less collegiate experience.*

With the statistics generated from data collection, this statement is not supported. Actually, this was quite the contrary. Fourth-year players did not shoot the highest free-throw percentage in any of the categories. Although, third-year players did shoot the highest overall road free-throw percentage at 73.11%, first-year players shot the highest in all other categories. This trend was completely not expected. Two possible explanations as to why third-year players shot the highest overall road percentage are presented. First, perhaps after having two years of experience, third-year players have learned to cope with the adversities that first-year and second-year players have yet to master. Second, perhaps among the third-year players are the most accurate free-throw shooters. This may be an indicator of these players' overall skill level, leading players of this subgroup to believe that their abilities are mastered enough to forgo their remaining

year of eligibility and pursue a professional career. This would leave only the less-skilled, and perhaps, less accurate shooters returning for their fourth year of competition. Thus, free-throw percentages would tend to decrease with a smaller number of sharp shooters within the group of fourth-year players. At any rate, explaining this phenomenon is beyond the scope of this study.

Explaining why first-year players shot the highest free-throw percentages in the remaining categories is just as puzzling. Perhaps, one explanation can be that first-year players may tend to practice harder to learn and develop as collegiate players. This would in turn allow them to refine their free-throw shooting. Table 8 shows road free-throw percentages from players among the four levels of experience.

*Table 8.* Road free-throw percentages by experience level.

	<b>Game</b>	<b>Final 5 Minutes</b>
<b>1<sup>st</sup> Year Players</b>	70.53%	<b>73.53%</b>
<b>2<sup>nd</sup> Year Players</b>	67.26%	66.37%
<b>3<sup>rd</sup> Year Players</b>	<b>73.11%</b>	72.92%
<b>4<sup>th</sup> Year Players</b>	67.61%	71.26%

  

	<b>Close Game</b>	<b>Close Game (Final 5 Minutes)</b>
<b>1<sup>st</sup> Year Players</b>	<b>72.83%</b>	<b>72.55%</b>
<b>2<sup>nd</sup> Year Players</b>	68.64%	69.12%
<b>3<sup>rd</sup> Year Players</b>	71.17%	68.49%
<b>4<sup>th</sup> Year Players</b>	65.10%	63.41%

## **CHAPTER V**

### **SUMMARY OF FINDINGS, RECOMMENDATIONS, AND CONCLUSIONS**

#### **Summary of Findings**

Two of the four hypotheses were supported by the results of the study. The first hypothesis that was supported was hypothesis #1: the conference champion will be the school where opposing teams collectively made the lowest percentage of free-throws. Clearly, when visiting teams make the lowest percentage of free-throws at any one venue, it gives the team who calls that venue home an advantage. That school already has an advantage by competing in the familiar confines of their home venue, but this advantage is heightened when opposing teams contribute by shooting poorly from the free-throw line. The home team's chance at winning the most games in conference increases, as was the case with Kansas. Texas must have performed superbly at other aspects of the game since this same trend was not evident. However, none of those aspects were researched during this study.

The other hypothesis that was supported in this study was hypothesis #3: the team with the highest percentage of points scored from free-throws in the final minute will be the conference champion. During this portion of the game, losing teams try to score as many points as possible before time expires in an attempt to decrease the point differential. As stated by Kozar et al. (1994), teams who are losing during the segment

will foul the winning team to force it to shoot free-throws. This strategy is implemented out of hope that the winning team will miss these attempts. If this happens, then the losing team has an opportunity to regain possession of the ball with no change in the margin of the score, and thus, can decrease the point differential if it scores on its ensuing possession. Losing teams then repeat this until time expires or they have gained the lead. However, if the winning team makes the free-throws, then the point differential increases and the losing team falls even further behind. In this case, the strategy backfires for the losing team. So as the game enters the final minute, winning teams must successfully shoot free-throws to maintain its lead. If the losing team continuously fouls to place a member of the winning team on the foul line to shoot free-throws and the winning team makes those free-throws, then most of the points scored by winning teams should be free-throws.

This hypothesis tested the two teams with the highest win total, Texas and Kansas. Both teams should have had the highest percentage of final-minute points scored from free-throws, but this was true only for Kansas. 57.78% of all of its final-minute points were scored from free-throws and 83.87% of final-minute points scored in road games were free-throws. Both these statistics were highest among all Big 12 teams. Texas, on the other hand, did not shoot near as well in these categories, therefore rejecting the hypothesis. Since its statistics were lower than not only Kansas', but also several other schools, it scored most of its final minute points with field goals. Perhaps, as mentioned earlier, Texas' margin of victory was so great in most games that it did not have to rely on final-minute free-throws to win games. Another possibility is that teams

were losing by such a large deficit that they neglected to implement the fouling strategy described earlier.

The remaining two hypotheses were not supported. One of the unsupported hypotheses was hypothesis #2: the conference champion will be the team with the highest road free-throw percentage. Both Texas and Kansas failed to rank atop the list of teams in this category. Surprisingly, teams that were ranked at or near the bottom of the overall conference standing ranked at least in the top two in each of the categories. Kansas did rank third in two of the categories, close games and close games in the final five minutes, thus somewhat supporting the aforementioned claim. But the fact that teams that won so few Conference games rank so high, rejected this hypothesis leading to the fact the making a high percentage of free-throws on the road does not necessarily lead to more victories.

The final hypothesis was also not supported. Hypothesis #4 stated that players with the most experience at the collegiate level will have higher road free-throw percentages than players with less collegiate experience. Seniors, or fourth-year players, were expected to have the highest free-throw percentages among the four levels of experience, but data revealed that this was not the case. Surprisingly, first-year players shot best in three of the four categories, while third-year players collectively had the highest overall free-throw percentages. Although these results were unexpected, patterns supporting this find were exposed. When each team's average level of experience was compared to road free-throw percentages, it was revealed that the five most experienced teams shot the five lowest road free-throw percentages (not necessarily in the same particular order) and three of the four least experienced teams was among the best free-

throw shooting teams on the road. Table 9 shows the average level of experience per team.

*Table 9.* Average level of experience per team.

Team	Years
Colorado	3.27
Kansas State	2.75
Oklahoma	2.7
Texas A&M	2.5
Missouri	2.45
Iowa State	2.42
Nebraska	2.42
Texas	2.4
Kansas	2.25
Oklahoma State	2.18
Texas Tech	2.1
Baylor	2.08

### **Recommendations**

Although statistical analysis from this study only supported two of the hypothesis, arguments can still be made that further research could present data to support this study's hypotheses. First, data for each was only reviewed from a total of 16 games, and furthermore, only eight home and eight away games. Perhaps if the study would have analyzed each team's data from a greater number of games, especially a higher number of home and away games, then results may possibly have led to support of all hypotheses.

The second possible improvement to the study would be to repeat the study over an extended period of time – over several seasons. If this occurs, trends and patterns may become apparent. Each year may provide different results, so the particular season studied in this research may have been an unusual year – a year when results skewed away from the norm. Repetitive studies would definitely set a norm, to which all results can be compared.

The third possible improvement to the study would be to include only players whose statistics qualify them to be included in the study. In other words, include players who only shoot a specified minimum number of free-throws. Since every player who shot at least one free-throw in a Big 12 Conference game in 2006 was included in this current study, it is possible that the players who were among the conference's lowest free-throw attempters may have distorted the results of this study. So by focusing on the most participative players, results may have been adjusted in a direction that would favor this study's hypothesis.

The final improvement that may lead to increased support of the hypotheses would be to research other statistics of games. Perhaps by including field-goal percentages or defensive statistics may lead to explanations as to why Texas tied with the highest number of wins, even though it ranked so poorly in the free-throw categories analyzed in this study.

### **Conclusions**

Along with the previously conducted studies, this study adds to the research that attempts to explain the measures affecting free-throw shooting in basketball games. Are there certain variables intrinsic to the game that affect free-throw shooters – time of the game, score at the point of attempts, or meaningfulness of game perhaps? Or are there variables that affect shooters extrinsic to the game – crowd noise or other fan distractions perhaps? Or maybe a combination of intrinsic and extrinsic factors leads to negative affects on free-throw percentages. This study just adds to the ongoing research as to how free-throw shooting is affected and just how much of an impact free-throw shooting has

on the outcomes of basketball games in terms of wins and losses. Research should be continued as long as questions are left unanswered. In the meantime, players and coaches should continue to practice and strive to improve upon *all* aspects of basketball games, and fans should remain fans.

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Scope and Method of Study: The purpose of this study was to investigate measures that affected free-throw shooting in Big 12 Conference men's basketball games during the 2006 season. All attempted free-throws were categorized into free-throws attempted in close games, in the final five minutes, and in close games in the final five minutes. These statistics were then compared to the final conference standings to determine if a relationship existed between high free-throw success rates and the conference champion. Also, relationships between levels of collegiate experience and free-throw successes and between the percentage of teams' final minute points being contributed by free-throws and final standings were examined.

Findings and Conclusion: This study determined that the most difficult place to attempt free-throws was the conference champion's venue. Also, the conference champion ranked high in every statistical category pertaining to free-throws, and surprisingly, players with only one year of collegiate experience dominated most of the free-throw categories.

Advisor's Approval: Dr. Steven Edwards