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Graduate Studies

ANALYSIS OF SCORING STRATEGIES IN COLLEGE WRESTLING

Manuscript Style Thesis Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Science in Physical Education Teaching

Ryan Farwell

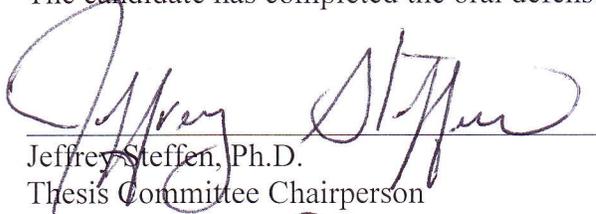College of Science and Health
Physical Education Teaching

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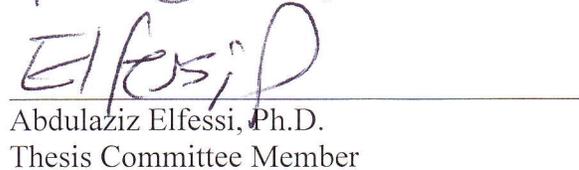# ANALYSIS OF SCORING STRATEGIES IN COLLEGE WRESTLING

By Ryan Farwell

We recommend acceptance of this thesis in partial fulfillment of the candidate's requirement for the degree of Master of Science in Physical Education Teaching.

The candidate has completed the oral defense of the thesis.

Jeffrey Steffen, Ph.D.
Thesis Committee Chairperson

5/16/13
Date

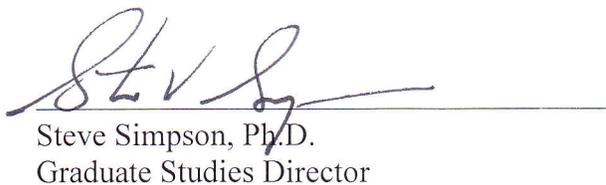Abdulaziz Elfessi, Ph.D.
Thesis Committee Member

5/16/13
Date

David Malecek, M.S.
Thesis Committee Member

5/16/13
Date

Thesis accepted

Steve Simpson, Ph.D.
Graduate Studies Director

6/6/13
Date

ABSTRACT

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The purpose of the present study was to analyze the scoring strategies in college
wrestling to identify a relationship to winning the wrestling match. Sixteen collegiate
wrestlers from the University of Wisconsin-La Crosse, a division three college in the
Midwest, participated in the study. Fifteen factors were chosen by anecdotal theories and
experts in the sport as possible indicators of success in a wrestling match. The data was
collected from fifteen matches of each wrestler during the 2012-2013 wrestling season.
The results could allow for a better understanding of what factors are the best predictors
of a win of a wrestling match. A Chi-square test (χ^2) was done on each individual
variable to find the relationship between each variable to the outcome of the wrestling
match. Unanswered points (83.5%), leading the second period (83.6%), and first
takedown (79.9%) had the highest percent to the outcome of the match and were all
significant ($<.001$) to winning the wrestling match. A multiple logistic regression was
used to investigate the relationship of all the predictors to winning a collegiate wrestling
match. Riding time, third period points, first takedown, leading the second period, and
unanswered points were included in the equation which revealed a 93.2% of correct
predictions.

ACKNOWLEDGEMENTS

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INTRODUCTION

Understanding factors that influence a wrestling match is important to effectively predict winning the match. As Massidda and Calo (2012) showed, by analyzing the statistics of a sport performance, common indicators that show predictability can be found. This would be significant to the sport of wrestling so coaches and wrestlers could tailor their coaching strategies to fit the results of the statistics. According to Ortega, Cardenas, Sainz de Baranda, and Palao (2006), match analysis allows coaches and athletes to improve sport performance based on the analysis outcomes. For example, it has been shown that elite coaches in a basketball setting spend a large portion of their practice working on technical and tactical instruction. (Bloom et al. 1999). This may correspond with most elite level sports, such as a collegiate wrestling practice.

Wrestling has continued to grow in participants and popularity since the first National Collegiate Athletic Association (NCAA) championship. Many studies regarding collegiate wrestling have been conducted such as weight loss in wrestlers (Buskirk 1976) and injuries in wrestling (Estwanik, et al. 1978). In an attempt to understand predictors of winning a collegiate wrestling match, there have been many anecdotal theories. For example, many coaches believe that the first takedown alone is a good predictor of a win. Also, depending on the coaching philosophy, some believe number of takedowns or scoring at the end of the period are successful predictors of winning a wrestling match. The factors that have been identified by collegiate coaches and experts in wrestling observed for this study were: first takedown, number of

takedowns, number of near falls, number of reversals, number of cautions, number of stalling warning/points, riding time advantage, number of times scored in the first ten seconds of a period, number of times scored in the last ten seconds of a period, number of times scored on the edge of the mat, winning the match by eight or more points, leading the first period, leading the second period, instances of unanswered points, and total third period points.

Many theories have been used to understand winning predictors in a collegiate wrestling match. However, all the theories have been anecdotally developed and there have been no research efforts to systematically examine the relationship between the predictors and winning. The purpose of this study is to analyze the scoring factors that have a relationship to winning a collegiate wrestling match. To achieve this purpose, the selected factors were analyzed to determine if they are significant to winning and to see if the factors can determine predictability of the outcome of the match.

METHODS

Participants

Study participants were 16 collegiate wrestlers aged 18 to 23 who range in weight class from 125 to 285. The participants were selected from a division three university in the Midwest. All participants have varied experience in the sport of wrestling. Study approval was obtained from the university institutional review board. Participants completed informed consent forms before data collection.

Instrument

Matches were coded using a modified tool from the United States Youth Wrestling Organization's standard score sheet. The wrestling matches consist of three periods that accumulate to a total of seven minutes and possible overtime periods. The instrument has been modified by the researcher and has been used to code wrestling matches from previous years to confirm that it can adequately account for each variable. The researcher conducted a pilot study by having college coaches from the University of Wisconsin-La Crosse code matches to compare to the researchers coding to test reliability. (APPENDIX B) When coding only the University of Wisconsin- La Crosse participants selected were viewed and the opponent's actions were not taken into consideration. The tool was modified in two ways; the researcher added a section in the tool to account for the first ten seconds of a match and the last ten seconds of the match. The second way the tool was modified was the researcher added to the key to account for

the factors that are not normally scored in a wrestling match. The factors that were observed and coded were:

- First takedown (FT) - The first takedown in the wrestling match

- Number of takedowns (T) - The total number of takedowns that are awarded by the referee in the wrestling match.

- Number of near falls (N) - The total number of near falls that are awarded by the referee in the wrestling match.

- Number of reversals (R) - Total number of reversals that are awarded by the referee in the wrestling match.

- Number of cautions (C) - Total number of cautions given by the referee during the wrestling match.

- Numbers of stalling warning/points (S) - Total number of stalling warnings given to the wrestler by the referee.

- Riding time advantage (RT) - The variable was coded if the wrestler was awarded a point for accumulating a minute or more of riding time.

- Number of times scored in the first or last ten seconds of a period- Any time a scoring variable was awarded in the first or last ten seconds of a period.

- Number of times scored on the edge of the mat (SE) - The variable was coded if a scoring variable occurred with at least one point of the wrestler out of bounds.

- Winning the match by eight or more points- The wrestler scored eight or more points in the entire wrestling match.

- Leading the first period- The wrestler was leading at the end of the first period.

- Leading the second period- The wrestler was leading at the end of the second period

- Instances of unanswered points (UP) - The wrestler scored and then did not allow the opponent to score in that period.

- Third period points- Two or more points were scored in the third period.

At the end of the coding process the results for each factor were placed in an area on the tool to easily identify the data.

Procedures

At each event, trained staff videotaped the entire match each time any of the sixteen participants wrestled. Two Sony Handy Cams were used to video the wrestling matches. The camera was placed on at the edge of the mat, usually in the coach's corner. The camera recorded the whole match and was not shut off for injury or blood time. After the event the cameras were taken by the researcher and the film was uploaded to a computer. The data was then transferred and kept on the researcher's computer and external hard drive. After each event the wrestling matches were coded using the modified tool from the United States Youth Wrestling Organization's standard score sheet. The researcher viewed each video in its entirety from beginning to end and used a tally system to record the factors on the tool as they were observed during each recorded match. During matches when the riding time clock was not visible in the video, riding time was kept by the researcher with two stopwatches, one for each wrestler. The time was compared to see which wrestler had the riding time advantage. Fifteen matches were selected for each wrestler from the 2012-2013 wrestling season. In total, 240 wrestling matches were observed and coded by the researcher.

Analysis

A Chi-square test ($\chi 2$) was done on each individual variable to find the relationship between each variable to the outcome of the wrestling match. A multiple logistic regression was used to investigate the relationship of all the predictors to winning a collegiate wrestling match and to create an equation to predict the outcome based on the observed variables.

RESULTS

Chi-square results for the fifteen variables confirmed thirteen of the fifteen variables had a significant occurrence to winning a wrestling match. The test revealed that unanswered points were significant to the outcome of the wrestling match (<.001). Out of the 164 matches that unanswered points were observed, 137 (83.5%) of those matches had winning outcomes. Leading the second period was also significant to the outcome of the wrestling match (<.001).   Out of the 128 winning matches leading the second period was present in 107 (83.6%) matches.   First takedown was significant to the outcome of the wrestling match (<.001). Out of the 164 matches that the variable was present in 131 (79.9%) were winning matches. Stalling was revealed as the least significant (.187) appearing in 29 (17.7%) of the 164 winning matches. All the variables can be seen in Table 1 below.

Table 1. Chi-square tests on Variable

Variable	Chi-square value	df	Sig.
Leading the Second Period	92.153	1	<.001
Unanswered Points	112.036	1	<.001
First Takedown	102.482	1	<.001
Third Period Point	39.920	1	<.001
Leading the First Period	70.318	1	<.001
Scoring 8 or more points in a match	62.688	1	<.001
Takedowns	120.465	2	<.001
Nearfall	54.519	1	<.001
Riding Time	51.220	1	<.001
Scoring on the Edge	38.555	1	<.001
Scoring in the last ten seconds of a Period	11.535	1	.001*
Scoring in the first ten seconds of a Period	6.648	1	.010*
Cautions	4.727	1	.030*
Reversals	2.592	1	.107
Stalling	1.738	1	.187

*p-value <.05

To predict winning with an equation of the variables a logistic regression was used. After running multiple models the factors with the most predictability and significance included: riding time ($<.001$), first takedown ($<.001$), third period points ($<.001$), unanswered points ($.001$), and leading the second ($.008$). These five variables showed a 93.2% of correct predicted outcomes of wrestling matches. Riding time had the largest coefficient at 4.84 which gives riding time 126.28 odds ratio. Leading the second period had the lowest coefficient with 2.196 which gave the variable an 8.99 odds ratio. The equation data can be seen in Table 2 below.

Table 2. Output from Logistic Regression

Variable	Coefficient	Standard Error	df	Sig.	Odds Ratio
Riding Time	4.84	1.223	1	<.001	126.28
Third Period Point	3.36	.957	1	<.001	28.74
First Takedown	3.58	.897	1	<.001	35.74
Leading the Second Period	2.19	.833	1	.008*	8.99
Unanswered Points	2.52	.757	1	.001*	12.48

* p-value <.05

DISCUSSION

The findings in this study show unanswered points (83.5%), leading the second period (83.6%), and first takedown (79.9%) had the highest percent to the outcome of the match and were all significant (<.001) to winning the wrestling match. A multiple logistic regression was used to investigate the relationship of all the predictors to winning a collegiate wrestling match. Riding time, third period points, first takedown, leading the second period, and unanswered points were included in the equation which reveled a 93.2% of correct predictions. Variables that were not included in the equation were: takedowns, near falls, scoring on the edge, scoring eight or more points, leading the first period, cautions, stall warnings, scoring in the first ten seconds, scoring in the last ten seconds, and reversals.

Using these results, coaches could tailor their instruction and offensive strategies to better prepare their athletes. For example, a coach emphasizing riding techniques and attacking in the top position to improve their athletes ability to collect the riding time point would increase their odds ratio of winning 126.27 times. Coaches focusing on perfecting takedown technique and being aggressive at the beginning of the match could contribute to the success of their wrestlers considering first takedown would increase their odds ratio of winning 35.74 times. First takedown was present in 79.9% of the 164 winning matches providing further evidence that an aggressive strategy at the beginning of a match could increase odds for a win. A coach must use caution in putting too much

emphasis on the first takedown to avoid a negative psychological effect on the wrestler during the match. Too much focus on getting the first takedown during practice might impact the wrestler's confidence in an actual match resulting in a reduced effort after the first takedown is scored. Instead a coach should promote the wrestler adapting during the match to utilize the variables that could have the greatest impact on the outcome of the match. For example, in situations when the opponent gets the first takedown and the wrestler is put in a defensive position, coaches could instruct the wrester to focus on another variable such as being the last one to score in the period. Stalling was revealed as the least significant (.187) so coaches must instruct their wrestlers to be active even when being defensive to avoid getting called with stalling. This could be accomplished by staying in good position in the middle of the mat while continually moving the opponent out of position to ward off any attacks initiated by the opponent. While maintaining this defensive strategy, the wrestler could be setting up an opportunity to be the last one to score in the period ensuring an unanswered point.

An athlete could use this information to tailor their strategies to fit their style of wrestling. The wrestler could look at the results to find the areas that they are proficient and then work to improve in the other areas that could be beneficial to winning the match. A wrestler could also use the information to be more prepared for offensive and defensive situation in the wrestling match. For example a wrestler could be proficient on their feet but struggle with riding the opponent. The wrestler can respond during the match adapting as necessary to increase their advantage by utilizing the five variables that are the best predictors of success. A wrestler could also use this information during the match. If the wrestler is losing, the wrestler would then try to collect as many of the

variables that are still available in the match or try to prevent the opponent from collecting the variables.

When looking for the best equation number of takedowns did show significance in some models but was no longer significant when unanswered points were put into the equation number of takedowns. This could mean that takedowns and unanswered points are related in some way. Takedowns have been a part of many anecdotal theories of coaches and in this present study they were found significant ($<.001$) with two or more takedowns occurring in 57.9% of winning matches.

Future research, the researcher should include multiple teams and a larger sample. This could allow for a larger amount of variables to be factored into the logistic regression because of the different strategies and styles that other teams may have. Another question to be addressed is the variables used in the study. Future researchers are encouraged to explore more variables that may affect the outcome of the wrestling match. Also for future research, collecting film from different divisions of the NCAA and categorizing the data to different weight classes would be beneficial to the study. There is a difference in styles of wrestling from a lower weight to an upper weight wrestler and this could change the important variables for that specific weight class or groups of weight classes.

Consideration of the amount of video equipment that the researcher has available is very important to completing the study. Many times a team has multiple wrestlers wrestling at the same time during tournaments. Something to consider would be the amount of time, equipment and cooperation from the college/university the researcher is

allowed to complete the study. Since this is the only known research in this area of the sport there is a call for future research regarding this study.

This study contributes knowledge of the predictors that have the greatest outcome on the wrestling match, and also provides a base for future researchers in the sport to gain more knowledge of the most influential predictors that have an effect on the outcome of the wrestling match.

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APPENDIX A

REVIEW OF LITERATURE

Literature Review

Throughout the history of collegiate wrestling coaches and wrestlers have identified many anecdotal theories of what wins a wrestling match. Coaches have different styles of coaching and emphasize on different techniques/tactics that they believe results in winning wrestling matches. However, there has not been any recent study that has measured the relationship of scoring variables and success in wrestling (winning). Thus, a literature review of other sports is warranted to obtain knowledge of how predicators in different sports relate to winning. This review focuses on the literature of the following topics: (a) Effects of variables on the outcome of the sport, (b) and modifications on techniques/tactics. This review will provide an outline of the predictors in various sports and how they relate to the outcome/winning of that sport. Eventually this will provide the ideas to develop the appropriate tools and predictors for the sport of wrestling.

Effects of Variables on the Outcome of the Sport

These studies showed the understanding of how important it was to identify and find variables that affect the outcome of their event or sport. Since there has been little research on the sport of wrestling, especially when identifying predicting variables that show success, this literature review was to discover how other researchers related and showed effects of variables in their event or sport.

Research on psychological momentum has shown that early success in a competition (e.g. scoring first) is a strong predictor of outcome in sports such as tennis, wrestling, racquetball, and ice hockey. (Courneya 1990). This study helped developed predictors that are felt to be a large impact on the outcome of a wrestling match. Predictors such as the initial takedown have been used as a predictor to determine the

outcome in a wrestling match. This has mostly been looked at from a psychological perspective.   When selecting predictors this article showed the importance of first actions/scoring of an individual or a team. This article helped identify predicators like scoring early in the periods and getting the initial takedown in the wrestling match. Even though for the study of predictors that lead to success in a wrestling match there was no psychological research or data included, it influenced including the predictor of scoring in the last ten seconds of the match, mainly because of the affect a wrestler might feel after giving up points with little time left in the period.

Again as stated above each study has identified the most important performance indicators for their particular sport. Many of these indicators can relate to the various predictors for winning in wrestling. For example Mirvic et al. (2011) shows the importance of position in the water when shooting from the 5 meter line in water polo. Similarly Alcock (2010) showed the relationship of the free kick location in soccer and the characteristics of the free kick from various locations.   This reveals that location on a playing surface can be important to the outcome of the event. For example in wrestling, scoring on the edge of the mat is comparable to scoring at a particular location on the playing surface and could be identified as a predictor that affects the outcome of a wrestling match. Mirvic et al. (2011) also continues and takes into consideration how penalties can affect the outcome of a water polo game. Cautions and penalties could be considered as predictors on the outcome of the wrestling match.

Some researchers chose to select predictors based on time. For instance Largo and Martin (2007) showed the relationship between time of possession in a soccer game and the outcome of the soccer match. Their main finding was that the losing teams had

more possession time than the winning teams. This was because they had to possess the ball more to try and bring the match to a draw or win. This brought up the point of the importance of time in sporting events. For example in a wrestling match a performance predictor could be scoring in the first or last ten seconds of a period. This would show the importance of time management in a wrestling match.

Similarly some authors took a sports performance and broke those results into periods or halves. This allowed for the authors to show the relationship of the predictors to winning in certain game situations and controlling the affect of changing strategies. Arkes (2011) only took the statistics from the first half of a NFL football game. He did this because the statistics could be represented differently in the second half due to the changing strategies by the winning and losing teams. This also showed the importance of time management in a match and could be related to a winning wrestling predictor. Winning the first or second period in a wrestling match could be a significant predictor to the overall outcome of the wrestling match.

With these findings in the literature the articles have helped develop their sport in a technical and tactical way. The author's findings showed that there should be parts of the game or event that should be stressed whether in the practice setting or when planning for games/events. These articles have helped develop and refine the predictors that have been chosen as variables that have an effect on a wrestling match in the collegiate setting. The variables include: first takedown in the wrestling match, number of cautions, number of escapes, number of near falls, scoring in the first ten seconds of the period, scoring in the last ten seconds of a period, scoring on the edge of the mat, leading the first period, leading the second period, scoring more than eight points, instances of unanswered points (when a wrestler scores

and then doesn't allow point to be scored on him until the period ends), and penalty points. With this literature review it should give a plan to show the significance of the predictors in wrestling.

Strengths

There were many strengths in the research articles of predictive variables that have an effect on the outcome of a game or match. One of the main strengths identified was that the research performed was done objectively. This eliminates authors' bias from the data. As Vuleta et al. (2003) states, one of the fundamental issues in the research on team ball games is how to objectively measure and get unbiased data about the partial and overall performance of individual players and teams. Similarly Ortega et al. (2006) states, utilization of observation with validity, reliability, and objectivity in match analysis is an important step in eliminating subjective analysis. This relates and was taken into consideration in the study of finding predictors in wrestling that affect the outcome of the match. By only taking into consideration the wrestler, not his opponent, while basing the predictors strictly on scoring and not the presage variables of the wrestlers, it allows the variable to be unbiased and based on the scoring performance of the wrestler. This should allow for a clear identification of what predicting variables have the most affect on the match outcome. In the literature review there were strengths and weakness of the articles that helped refine the variables and with the information it will allow the study on wrestling to be more valid.

Weaknesses

In the studies there was one similar weakness that was reoccurring when referring to team sport predicators. This weakness was that in some cases in team sports the data results depend on the event situations. For example Largo and Martin(2007) state when referring to possession in a soccer match, teams' possession depends on the evolving

match status- whether the team is winning, losing, or drawing. Then articles including

team sports started to take game situation into consideration. Multiple articles gave

definitions to certain game situations for consideration when collecting the data. For

example in one article they labeled the game as close or balanced to consider game

situations. (Lorenzo et al. 2010) Then articles even went on to classify periods as close,

balanced, and unbalanced (Csataljay et al. 2011) or labeled different areas of the playing

area to take into account of the different situations that occurred during these activities

(Rooyen et al. 2007). This will be a consideration for the study of predictors that lead to

winning in wrestling. Taking into account the situation in the match can change the style

that the wrestler normally wrestles. Because the predictors are based on scoring there

will only be one wrestler being coded so the data should stay consistent.

Modification on Techniques/Tactics

Understanding the effects a variable has on the outcome of a particular sport/event

has large implications on the use of the variables. These predictive variables can help

with the use of the variables on the technical and tactical way they are used. As Ortega et

al.(2006) states, match analysis allows improvement and/or an acquisition of knowledge.

By analyzing the statistics of a sport performance we find there are common indicators

that show predictability. These predictors allow for coaches and participants to modify

their performance to relate to the findings.

Again there have been many studies on how variables affect the outcome of the

sport but there have not been any recent studies on variables that affect the outcome in

the sport of wrestling. Recognizing theses predictive variables can be critical to success

in the sport. As Sampaio et al.(2010) states when referring to the findings of predictors in

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basketball, basketball coaches (and players) will benefit from being aware of the results particularly when designing game strategies and when taking tactical decisions. Similarly Massidda and Calo (2007) confer when speaking about gymnastics. Knowledge of the different relationships between performance scores on apparatus and overall position during a World competition should help coaches to refine technique on the mot predictive apparatus and so improve their coaching. Again, Mirvic (2011) states feedback from the competition can be used in the positive transformation of an athlete's performance in order to achieve the effective results of a competition. Mirvic (2011) contends that information collected in an objective, valid and consistent manner, based on analysis and evaluation of key elements of the coach and the player, opens up new possibilities to improve water polo. Results on how variables affect the outcome of a college wrestling match can help improve coach's behaviors and teachings. It has been shown that elite coaches in a basketball setting spend a large portion of their practice working on technical and tactical instruction. (Bloom et al. 1999 p.168) This corresponds with most sports at the elite level and there can be a correlation on the type of instruction that takes place during a wrestling practice. This shows the importance of the predictors the coach believes will create a better chance to affect the outcome of the event or winning.

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APPENDIX B

CODING TOOL

Coding Tool

Coding Key	T-Takedown	N-Nearfall	R-Reversal	S-Staling S1-Staling point awarded	UP-Unanswered Points	SE-Scoring on the Edge
	C- Cautions	P- Penalty Point	FT- First Takedown			

10 sec	1st Period	10 sec	10 sec	2nd Period	10 sec	10 sec	3rd Period	10 sec

If Necessary

10 sec	1min Overtime	10 sec

10 sec	30sec	10 sec

10 sec	30 sec	10 sec

10 sec	1min Overtime	10 sec

10 sec	30 sec	10 sec

10 sec	30 sec	10 sec

Leading the 1st Period. Y or N		Riding Time advantage. Y or N	
Leading the 2nd Period. Y or N		Total 3rd period points	
8+ Points Y or N		Number of times scored in the first ten seconds	
First takedown in the match. Y or N		Number of times scored in the last ten seconds	
Number of T		Stall warning/points	
Number of R		Number of C	
Number of time SE		Number of UP	
Number of N			

*Escapes are not accounted for unless in total 3rd period points, leading the first and second period, and 8+ points.

**Riding time point is calculated in final score not 3rd period points.

APPENDIX C

INFORMED CONSENT

<u>**Informed Consent**</u>

<u>**Analysis of scoring strategies in college wrestling**</u>

I, _____, volunteer to participate and allow the rights to be filmed in a research study being conducted at the University of Wisconsin- La Crosse.

Purpose and Procedures

- The purpose of this study is to evaluate the effect of fifteen predictors that occur in a wrestling and how they correlate with winning a wrestling match.
- The study will consist of videotaping the fifteen wrestling matches in the 2012-2012 seasons.
- The time required will consist of the time that you are competing in the 2012-2013 season.
- Videos will be coded by the researcher

Potential Risks

- The risks consist of only the risks that take place in a wrestling which include:
  - Minor and major injury
- At every match there will be a certified athletic trainer and undergrad athletic trainers

Benefits of Participating

- Participants will gain knowledge of which predictors have the most influential effect on winning a wrestling match.
- This study will also benefit coaches, researchers, and the general public who are interested in the effect of predictors on winning a wrestling match.

Rights of Confidentiality

- My participation is voluntary
- I may choose to discontinue my involvement at anytime during this study without penalty.
- The results of this study have the potential of being published or presented at professional meeting, but only group data will be presented.

I have read the information provided on this consent form. I have been informed of the purpose of this study, procedures, and the expectations of myself as well as the researcher, and the potential risk/benefits that may be associated with the study.

Concerns about any aspects of this study may be directed to Ryan Farwell (913-231-0049) the lead researcher, or his advisors Jeff Steffen and Dave Malecek.

Participant's Name _____

Participant's Signature: _____Date:_____

Researcher's Signature: _____Date: _____