Full Length Research Article

IDENTIFYING COMPETITIVE ANXIETY FACTORS AFFECTING THE PERFORMANCE OF CRICKET PLAYERS: A MULTIVARIATE STATISTICAL APPROACH

*,[1]Madhana Gopal, R. and [2]Balamurugan, R.

[1]Department of Statistics, Madras Christian College, Chennai 600 059, Tamil Nadu, India
[2]Tamil Nadu Physical Education and Sports University, Chennai 600 048, Tamil Nadu, India

ARTICLE INFO

ABSTRACT

In India, cricket is seen different from other games. Many people play it in open space, and some choose it as their career but only a few perform well and reach its highest position. There are many reasons for ill-performance, among them one of the main reasons is competitive anxiety. Many good players are affected by anxiety at some point of time in their career. Therefore, identifying the competitive anxiety level in sports persons becomes a more important topic for researchers and trainers. The main purpose of the present study is to identify the competitive anxiety factors influencing the performance of the college level cricket players. For this purpose, well structured questionnaire was developed and personally administrated to four hundred and eighty college level cricket players in and around Coimbatore city, Tamil Nadu. Of these, four hundred and sixty eight questionnaires (97.5%) was filled fully and received back. Statistical methods K-means clustering was used to group the dataset, and then keeping these groups as dependent variable, a stepwise discriminant analysis was performed to reduce the number of questions and also to select most appropriate questions. Factor analysis was applied on the selected questions and it found the factors affecting the performance. The empirical results suggest that two groups were meaningful, based on the mean values groups, named as high and low anxiety. Stepwise discriminant analysis selected eight variables and from factor analysis internal pressure was the most important factor which affects the performance of the players.

INTRODUCTION

Fear and anxiety are not new to mankind. It is a psychological factor which is created when a person loses his level of confident due to inside or outside pressure. Darwin (1965) considered anxiety to be an inbuilt and adaptive characteristic of both humans and animals that had evolved over generations through the process of natural selection. Anxiety is defined by many authors in different views; the medical definition describes it as a state consisting of physical and psychological symptoms brought about by a sense of apprehension of a perceived threat. Worchel and Goethals (1989) defines as the uncertainty in how to cope stress. Fear, angry, trembling, unbalance mind, sweating, increased body heat and perspiration rate are the components of anxiety. Generally, psychologists divide anxiety into two different component such as trait and state component. Trait component is referred as an inbuilt in person personality and it varies from person to

person according to how one react and manage the stress. Quite often it is easy to fall in stress and anxious, if trait anxiety is high in a person. Anxieties which are created due to high emotion that develops in response to fear or danger of a particular situation are referred to as state anxiety. It affects performance of the person very severely. This type of anxiety differs from time, person and place. Anxiety was one of the most critical problems in modern sports psychology (Athan and Sampson, 2013). The performance of sports person was much affected by competitive anxiety (Esfahani and Soflu, 2010). It can be seen in two ways, *viz*., positive and negative anxiety. Sometimes games *viz*., rugby, wrestling, boxing etc., anxiety is the main motivator for success at the same time sports *viz*., chess, shooting need low level of anxiety to perform well. Recently, increased amounts of research are conducted on this topic to identify the reasons. In India, cricket is seen different from other games. Many people play it in open space, and some choose it as their career but only a few perform well and reach its highest position. There are many reasons for ill-performance, and among them one of the main reasons is competitive anxiety. Many first class players

*Corresponding author: Madhana Gopal, R.
Department of Statistics, Madras Christian College, Chennai 600 059, Tamil Nadu, India

are affecting by anxiety at some point of time in their career. Fear and nervousness increases while playing and affects the performance. Therefore, it becomes necessary to identify main competitive anxiety factors which affect the performance of the players.

Literature review

Anxiety in other sports

Several studies have been investigated regarding in this area. Sports can be seen in two different forms *viz*., individual and team. Griffin (1972) and Simon and Martens (1979) reported team athletes will have less level of anxiety than individual athletes. Studies on anxiety were conducted based on the different characters, *viz*., age (Brustad, 1988; Kirubakan and Gopinath, 2013), type of sports (Furst and Tenenbaum, 1986; Martens *et al*., 1990), among gender females players have more anxiety level than male (Jones and Cale, 1989; Martens *et al*., 1990; Jones *et al*., 1991), Swain and Jones (1992) regarding the experience anxiety is more for less experience than higher experience athletes. Nordell and Sime (1993) stated that there was no relationship between trait and state anxiety and both are different in the emotional. Performance in sports and anxiety shows negative relationship. Early research exhibited that relationship between physiological factors and performance was initially based on the inverted U hypothesis (Yerkes and Dodson, 1908). Martens *et al*. (1995) looked the relationship of performance and anxiety using multidimensional approach and found that strong negative linear relationship exists between them.

Recent study on anxiety in cricket

Kirubalan and Gopinath (2013) compared anxiety among different age groups of city league male cricket players and their results suggest no significant different existing among age group of the players. This shows that age does not play any role in creating anxiety, if psychological factors such as positive thinking or talk, boosting confident and mindset are the key factors to get ridge of anxiety and perform well in the field. Sangeeta Singh (2013) compared sports competitive anxiety among university cricket players, their study shows all the university players have competitive anxiety. Balaji (2011) applied factor analysis and found that external pressures are the key element which affects the performance of the cricket players.

OBJECTIVE

The main objective of the present study was to identify the key competitive anxiety factors which affect the performance of the cricket players. The key question of the present investigation was

- What are the main anxiety factors which affects the performance of college level cricket players?

DATA COLLECTION

The source of data for any research can be acquired in two ways, *viz.,* primary and secondary methods. Data being collected or obtained from a first-hand experience is referred as primary; on the other hand, data gathered in past or obtained from other party are referred as secondary. In the present study, using primary methodology, data was obtained. For this purpose a well structured questionnaire with twenty five questions which were relevant to anxiety towards cricket players was prepared and personally administrated to four hundred and eighty college level cricket players in and around Coimbatore city, Tamil Nadu, India using simple random techniques. Of these, four hundred and sixty eight questionnaires (97.5%) was filled fully and received back. Therefore, our data sheet consist of (25 x 468), 11700 observations.

MATERIALS AND METHODS

Data analysis for the present study was done in three phases. In the first phase, K-mean clustering technique was used to group the dataset into different categories. In the second phase, keeping clustered group as grouping variables and scores of twenty five questions as independent variables, a Stepwise Linear Discriminant Analysis (S-LDA) was performed to select the best questions which were more significant in identify the factors for ill-performance of the cricket players due to competitive anxiety. In the last phase, Factor Analysis (FA) with Principal Component Analysis (PCA) was applied on the selected questions of stepwise linear discriminant analysis to obtain the competitive anxiety factors which were affecting the performance of the cricket players.

RESULTS AND DISCUSSION

As reported elsewhere in methodology (section 3.3), multivariate statistical test *viz*., K-mean clustering, Stepwise Linear Discriminant Analysis and Factor Analysis were used to discover the key competitive anxiety factors which affected the performance of the cricket players. For various statistical analysis of the present study, the statistical software, IBM SPSS 19 version was used.

Empirical results of K-means clustering

The name for this method is gained from its method of operation. The k-means cluster algorithm divides the observation into k groups, where k is the number of clustered to be formed. Identifying the best number of cluster was subjective; the algorithm does not provide any information regarding the appropriate number of cluster to be used. Therefore, in present study, clustering was carried with different k values *viz.,* (2,3,4,5,6, …) and on observing the results, it was concluded that 2-clustering exhibits the meaningful information than other number of clustering. Table 4.1.1, shows the number of cases in each cluster. Based on the mean value of the each cluster, cluster-1 was named as high-level and cluster-2 as low-level anxiety groups.

Table 4.1.1. Number of cases in each cluster

Cluster	Number of cases
1	225
2	243
Total	468

Empirical results of stepwise linear discriminant analysis

In the second stage, S-LDA was applied to obtain the most important questions which were more significant in identifying

Table 4.2.1. Best Question for Identifying Competitive Anxiety of Cricket Players

Serial. no	Selected Questions
1	I get butterfiles in my stomach when the first ball I face is a bouncer body line.
2	An injury during the game makes me uncomfortable.
3	I avoid my team mates before I step into the field of play.
4	When I Pad up for batting I feel nervous.
5	Failure in the last match put me under pressure.
6	I feel much worried if the ball strikes my helmet.
7	I get frustrated when batsman at the other end gets out cheaply.
8	I feel frustrated when the ball beats me quite often.

with two questions, revealing the frustration of the players. Fourth factor was loaded with one question, indicating worries of the players. Therefore, coaches or trainers of the cricket, first have to concentrate more on internal pressure of the players since these pressures make more failures in the field.

CONCLUSION

The main aim of present study was to identify the factors affecting the performance of the cricket players. For this purpose well structures questioners were prepared and information was collected regarding the affecting factors from

Table 4.3.1. KMO, Bartlett's test, Eigen values, percentage of Variance, Rotated Factor Loading for Competitive Anxiety

		Internal Pressure	Uneasiness	Frustrated	Worry
KMO of Sampling Adequacy		0.756			
Bartlett's test approx. Chi-Square (Significance)		3145.24 (0.000)			
		FACTORS			
		Internal Pressure	Uneasiness	Frustrated	Worry
Initial Eigen Values	Total	1.178	1.116	1.039	1.002
	% of Variance	14.729	13.950	12.984	12.526
	Cumulative %	14.729	28.678	41.662	54.189
Selected Questions		Rotated Factor Loading			
I get butterflies in my stomach when the first ball I face is a bouncer body line		0.686			
Failure in the last match put me under pressure		0.579			
When I Pad up for batting I feel nervous			.676		
I avoid my team mates before I step into the field of play			.540		
An injury during the game makes me uncomfortable			-.428		
I feel frustrated when the ball beats me quite often				.729	
I get frustrated when batsman at the other end get out cheaply				.655	
I feel much worried if the ball strikes my helmet					0.840

the factors for ill-performance of the cricket players due to competitive anxiety. Linear Discriminant Anlaysis (LDA) is a supervised dimensionality reduction technique and classification (Fukunaga, 1990; Duda, 2000; Hastie, 2001; Martinez, 2005; Bishop, 2006; Ji and Ye, 2008). S-LDA was carried out by keeping cluster groups of k-means as grouping variables and scores of twenty five questions as independent variables. Table 4.2.1, given the best set of questions out of initial 25 questions from S-LDA.

Empirical results of factor analysis

FA is a statistical data reduction technique also used to identify structure in the relationship between variables. FA was constructed on the selected questions from S-LDA (Table 4.2.1). Table 4.3.1 shows, KMO, Bartlett's test, Eigen Values, Percentage of Variance, and Rotated Factor Loading of Competitive Anxiety which would make ill-performance of cricket players. KMO test is observed as 0.756, which is considered as a reasonably good and Bartlett's test was significant, and it shows that correlation matrix is not an identity matrix. Factor analysis extracted four factors with eigen value greater than or equal to one that account for 54.19% of the variance of competitive anxiety (eight questions were concentrated into four factors).

Naming and Interpretation of Factors

Eight questions are grouped into four factors on the basis of the relationship among themselves. First factor was loaded by two questions, based on the nature of questions it was named as internal pressure. This shows that internal pressures of the players are the key factor for ill-performance of the players. Second factor was loaded with three questions, thereby showing the uneasiness of the players. Third factor was loaded

four hundred and sixty eight college level cricket players. Multivariate statistical test *viz*., K-Mean clustering for grouping, linear discriminant analysis to extract the best questions which are more relevant for the study and factor analysis were used to obtain the competitive anxiety factors which were affecting the performance of the cricket players. From factor analysis, it was found that internal pressure, uneasiness, frustration and worries were the major factors affecting the players.

REFERENCES

Athan, A. N. and Sampson, U. I. 2013. Coping with pre-competitive anxiety in sports competition, European Journal of Natural and Applied Sciences, 1(1):1-9.

Balaji, P. 2011. Construction of Competitive Anxiety Questionnaire and Computation of Norms for Cricket Players, Ph.D thesis, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India.

Bishop, C. M. 2006. Pattern Recognition and Machine Learning, Springer.

Brustad, R. 1988. Affective Outcomes in Competitive Youth Sport: The Influence of Intrapersonal and Socialization Factors, Journal of Sport & Exercise Psychology, 10: 307-321.

Darwin, C. 1965. Expressions of Emotions in Man and Animals, Chicago: University of Chicago.

Duda, R. O., Hart, P. E., and Stork, D. 2000. Pattern Classification. New York: Wiley.

Esfahani, N and Soflu, G. H. 2010. The Comparison of Pre-Competition Anxiety and State Anger between Female and Male Volleyball Players, World Journal of Sport Sciences, 3(4): 237-242.

Fukunaga, K. 1990. Introduction to Statistical Pattern Recognition, 2nd ed. San Diego, CA: Academic Press.

Furst, D.M and Tenenbaum, G. 1986. The Relationship Between Worry, Emotionality and Sport Performance, In D.M. Landers (Ed.), Sport and elite performers (pp. 89-96), Champaign, IL: Human Kinetics.

Griffin, M. R. 1972. An Analysis of State and Trait Anxiety Experienced in Sports Competition by Women at Different Age Levels, Ph.D Thesis, Louisiana State University.

Hastie, T., Tibshirani, R and Friedman, J. H. 2001. The Elements of Statistical Learning: Data Mining, Inference, and Prediction. New York: Springer-Verlag.

Ji. S and Ye. J. 2008. Generalized Linear Discriminant Analysis: A Unified Framework and Efficient Model Selection, IEEE Transactions on Neural Networks, 19 (10): 1768-1782.

Jones, G and Cale, A. 1989. Pre-Competition Temporal Patterning of Anxiety and Self Confidence in Males and Females, Journal of Sport Behavior, 12: 18-195.

Jones, G., Swain, A.B.J and Cale, A. 1991. Gender Differences in Pre-Competition Temporal Patterning and Antecedents of Anxiety and Self-Confidence, Journal of Sport & Exercise Psychology, 13: 1-15.

Kirubalan, G. and Gopinathan, P. 2013. Analysis of Anxiety among Different Age Groups of City League Male Cricket Players, Academic Sport Scholar, 2(9): 1- 4.

Martens, R., Vealey, R.S and Burton, D. 1990. Competitive Anxiety in Sport. Champaign, IL: Human Kinetics.

Martinez A. M and Zhu, M. 2005. Where are Linear Feature Extraction Methods Applicable?, IEEE Transactions on Pattern Analysis and Machine Intelligence, 27(12): 1934–1944.

Nordell, K and Sime, W 1993. Competitive Trait Anxiety, State Anxiety, and Perceptions of Anxiety: Interrelationships in Practice and in Competition, Journal of Swimming Research, 9: 19-24.

Sangeetha Singh 2013. Sport Competition Anxiety Among University Level Cricket Players: A Comparative Study, International Journal of Research Pedagogy and Technology in Education and Movement Sciences, 1(3): 133-139.

Simon, J. A and Martens, R. 1979. Children's Anxiety in Sport and Non-Sport Evaluation Activities, Journal of Sport Psychology, 1: 160-169.

Swain, A.B.J and Jones, G. 1992. Relationship between Sport Achievement Orientation and Competitive State Anxiety, Sport Psychologist, 6: 42-54.

Worchel, S and Geothals, G. R 1989. Adjustment: Pathways to Personal Growth, Englewood Cliffs, New Jessy: Prentice-Hall.

Yerkes, R. M and Dodson, J. D. 1908. The Relation of Strength of Stimulus to Rapidity of Habit Formation, Journal of Comparative Neurology and Psychology, 18: 459-482.

****