

Research article

## Goal profiles, mental toughness and its influence on performance outcomes among Wushu athletes

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### Abstract

This study examined the association between goal orientations and mental toughness and its influence on performance outcomes in competition. Wushu athletes ( $n = 40$ ) competing in Intersports championships in Malaysia completed Task and Ego Orientations in Sport Questionnaire (TEOSQ) and Psychological Performance Inventory (PPI). Using cluster analysis techniques including hierarchical methods and the non-hierarchical method ( $k$ -means cluster) to examine goal profiles, a three cluster solution emerged viz. cluster 1 - *high task and moderate ego* (HT/ME), cluster 2 - *moderate task and low ego* (MT/LE) and, cluster 3 - *moderate task and moderate ego* (MT/ME). Analysis of the fundamental areas of mental toughness based on goal profiles revealed that athletes in cluster 1 scored significantly higher on negative energy control than athletes in cluster 2. Further, athletes in cluster 1 also scored significantly higher on positive energy control than athletes in cluster 3. Chi-square ( $\chi^2$ ) test revealed no significant differences among athletes with different goal profiles on performance outcomes in the competition. However, significant differences were observed between athletes (medallist and non medallist) in self-confidence ( $p = 0.001$ ) and negative energy control ( $p = 0.042$ ). Medallist's scored significantly higher on self-confidence (mean =  $21.82 \pm 2.72$ ) and negative energy control (mean =  $19.59 \pm 2.32$ ) than the non-medallists (self confidence-mean =  $18.76 \pm 2.49$ ; negative energy control mean =  $18.14 \pm 1.91$ ).

**Key words:** goal orientation, mental toughness, performance outcome.

### Introduction

Wushu encompasses all types of Chinese martial art. It began as an art of self defence to protect against wild animals and other humans. It was later used in combat, including war, and then gradually maturing into a fully developed international sport. This study examines goal profiles of wushu athletes using achievement theory framework (Nicholls, 1989) to capture the emphasis laid on task and ego orientations, and determine its relationship with mental toughness and performance outcomes in competition.

Goal perspective theory holds that personal goals influence an individual's thinking, feeling and actions in an achievement situation such as competition (Nicholls, 1989). It is assumed that in a competitive situation, the prevailing achievement goals, both task and ego relate to one's judgment on level of competence and subjectively define successful goal accomplishment (Nicholls, 1989). While task oriented athlete's judgment about success is self-referenced, an ego oriented athlete's judgment about

success is on beating other competitors. Duda et al. (1995) indicated that the performance related feedback of an individual's sport ability can have implications for an athlete's motivational orientation in terms of task and ego involvement. Duda et al. (1995) further indicated that performance outcome in a competition helps to ascertain an athlete's improvement (a task conception of ability) and/or are better/worse than others (an ego conception of ability).

Dimensions of task and ego orientations have been reported to be independent in sport settings (Chi and Duda, 1995; Duda and Whitehead, 1998; Robert et al., 1996), a proposal that concurs with Nicholls (1989) who argued that task and ego orientations are orthogonal constructs. Harwood and Treasure (2000) report the main effect of goal orientation separately without considering the interaction of task and ego orientations. However, when interactions of task and ego orientations are considered, four goal profiles are found: high task/high ego, low task/low ego, high task/low ego, low task/high ego. In other words, athletes can be high in orientations, low in both, or high in one orientation and low in the other. Hodge and Petlichkoff (2000) examined goal orientation profiles of male rugby players and indicated that moderate task/high ego profile resulted in a perception of better physical abilities. Hodge and Petlichkoff (2000) concluded that moderate to high task and ego orientation pattern may compliment each other to adapt in a competitive sport context. Duda (1997) suggested that most achievement-oriented profiles may consist of both high task and high ego goals. Duda (1997) further suggested that high task and high ego orientation would provide better opportunities for success. Duda and Treasure (2001) suggested that individuals with high task and high ego orientations would display adaptive goal profile enabling them to meet the demands of competition.

Therefore, in the present study, in order to avoid imposing restriction on the data, into four arbitrary group structures, and to allow room for moderate responses, we adopted to employ cluster analysis in this study, despite the limitation of sample size.

A factor often associated with successful performance in competition is mental toughness. Mental toughness can be considered as a mental skill factor. Some research findings has identified mental skills as a psychological construct that distinguishes between more and less successful performance across a number of sports; for example, golf (Thomas and Over, 1994), and equestrian, (Meyers et al., 1998). Mental toughness and its importance in competitive sports have been documented in

literature (see Goldberg, 1998; Hodge, 1994; Tunney, 1987; Williams, 1988). Loehr (1982; 1986) suggested that fifty percent of success in competitions could be attributed to mental toughness in athletes. On similar lines, Gould et al. (1987) indicated that coaches felt the importance of being mentally tough in achieving success in sports. Norris (1999) also emphasized the importance of mental toughness in the making of a champion athlete. Gould et al. (2002) studied the psychological characteristics of Olympic champions, and identified mental toughness as a significant contributor to sports performance enhancement.

A clear definition for mental toughness is still being researched. Loehr (1986) suggested that mentally tough performers are disciplined thinkers and respond to pressure by remaining relaxed, calm and energized. Loehr (1986) further suggested that mentally tough athletes have the ability to increase their flow of positive energy in adversities. Although recent research findings identified twelve attributes of mental toughness (see Fourie and Potgieter, 2001; Jones et al., 2002; Middleton et al., 2005), the seven fundamental attributes of mental toughness suggested by Loehr (1986), show similarities to those identified by recent researchers like Fourie and Potgieter, (2001); Jones et al. (2002); Middleton et al. (2005). Therefore in this study we considered the seven fundamental attributes of mental toughness suggested by Loehr (1986). Specifically, the mental toughness attributes include (1) self-confidence (i.e. belief that one can perform well and be successful), (2) negative energy control (i.e. to cope with negative emotions such as fear, anger, frustration and temper for achieving success), (3) attention control (i.e. stay focused and to perform well), (4) visualization and imagery control (i.e. creating positive mental images), (5) motivation level (i.e. the energy and willingness to persevere), (6) positive energy control (i.e. energized with fun, joy and satisfaction), and (7) attitude control (i.e. habits of thought and unyielding). Golby and Sheard (2003) studied mental toughness at different levels of rugby league and reported that the athletes scored significantly higher on two of the seven mental toughness subscales (negative energy control and attention control).

Sports performance in a competition is typically assessed through outcome measure. The outcome measure in Wushu in a competition is subjectively decided based on the style of different movements. A major challenge of the present study is the inclusion of performance outcome measure, considered as winning a medal in the intervarsity competition 2006, for the exclusive purpose of this study. We acknowledge the limitation that medalling in Wushu is a variable affected by different aspects like, an athlete's ability, the opponent's strengths or weakness, subjective bias in evaluation, an athlete's performance quality, level of competition, etc.

An unpublished research by Kuan (2007) relating goal profile, and mental toughness conducted on 203 state level male athletes, belonging to a particular state of Malaysia revealed that, athletes with goal profile high task/high ego, and high task/moderate ego scored significantly higher on the subscales of mental toughness. To date, no information about the relationship between goal

orientation, mental toughness and performance outcome exists in Wushu. To test the above relation the purpose of this study, were 1) to determine if mental toughness differed as a function of goal profile; 2) to determine if athletes with successful performance outcome displayed any particular pattern of goal profile; 3) to assess if athletes with successful performance outcome differed significantly in mental toughness.

## Methods

### Participants

Participants from 19 public and 11 private universities in Malaysia ( $n = 40$ ,  $21 \pm 1.66$  years; 21 males and 19 females) were recruited from the 2006 Malaysian Intersvarsity Wushu (Taolu) Championships. Intersvarsity Wushu competitions, recognized by Wushu federation of Malaysia, are held once in a year. Wusho Taolu includes *Chang Quan*, *Nan Quan*, *Tai Ji Quan*, *Dao Shu*, *Nan Dao*, *Qiang Shu*, *Jian Shu*, *Tai Ji Jian*, *Gun Shu*, *Nan Gun*, *San Shou*, *Chuan Tong Tai Ji Quan*.

### Measures

*Task and Ego orientation in Sport Questionnaire (TEOSQ)*; Duda and Nicholls, 1992), a 13 item inventory is designed to measure an individual's disposition to being task or ego oriented in sport. The questionnaire consisted of six-item measuring ego (e.g., "I can do better than my friends") and seven item measuring task (e.g., "I work really hard"). The responses are indicated on a 5-point Likert-type scale where 1=Strongly disagree, and 5=Strongly agree).

*Mental toughness: Psychological Performance Inventory (PPI)*; Loehr, 1986) a 42 items self report inventory with seven subscales, designed to measure factors that reflect mental toughness in an athlete were administered to the athletes. Each subscale consisted of six items measuring the seven fundamental areas of mental toughness viz. self-confidence (e.g., "I believe in myself as a player"), negative energy control (e.g., "I can remain calm during competition when confused by problems"), attention control (e.g., "I can clear interfering emotion quickly and regain my focus"), visualization and imagery control level (e.g., "Before competition, I picture myself performing perfectly"), positive energy control (e.g., "I can keep strong positive emotion flowing during competition"), and attitude control (e.g., "I am a positive thinker during competition"). The responses are indicated on a 5-point Likert-type scale where 1=Almost always, and 5=Almost never)

*Performance measure*: Winning a medal in the intervarsity competition was considered as successful performance outcome for the purpose of this study.

### Procedure

Necessary approvals from the organizing committee of the Intersvarsity competitions, consent from the coaches and players, were obtained prior to the administration of inventories. Protocol and procedures for this study were approved by the Research Ethics Committee of the University of the authors.

**Table 1. Descriptive statistics (n = 40).**

Variable	M	SD	Range	$\alpha$
Age (years)	21.43	1.66	19 – 27	
Competitive experiences (years)	2.66	1.60	1 – 8	
<b>Goal Orientations</b>				
Task	3.86	0.51	2.57 – 5.00	.84
Ego	3.15	0.70	1.67 – 5.00	.88
<b>Mental Toughness</b>				
Self-confidence	20.38	3.18	15 – 28	.79
Negative Energy Control	18.88	2.24	14 – 23	.71
Attention Control	18.77	1.85	14 – 22	.58
Visual & Imagery Control	19.63	3.39	13 – 29	.79
Motivational Level	20.53	3.69	13 – 29	.79
Positive Energy Control	20.85	2.64	16 – 26	.65
Attitude Control	20.27	2.77	15 – 29	.73
<b>Overall Mental Toughness (Total)</b>	<b>139.30</b>	<b>14.22</b>	<b>116 – 181</b>	

### Data analysis

Data analysis used SPSS version 12.0.1. All data were examined for missing values and univariate outliers. Histogram, q-q plots, scatter plot and skewness were conducted as recommended by Tabachnick and Fidell (2001). No missing values and outliers were found, which reflected that the assumptions of normality, homoscedasticity and linearity were met. Descriptive statistics were computed for all measures assessed. Inter-correlations were computed among all measures. To evaluate the internal consistency of TEOSQ and PPI, Cronbach's alpha coefficients also were examined.

Although, sample size was a limitation (due to the fixed number of participants for the specific competition), we used cluster analysis to generate goal profiles. We considered that cluster analysis is not as much a typical statistical test as it is a "collection" of different algorithms that "put objects into clusters according to well defined similarity rules" (Hill and Lewicki, 2006). Group profiles based on goal orientation using the cluster analysis procedures are the most recent method (see Carr, 2006; Cumming et al., 2002; Hodge and Petlichkoff, 2000; Wang and Biddle, 2001). In this study, the two-stage method of cluster analysis outlined by Hair et al. (1998) was adopted. The variables were standardized using z-scores. The distribution of clustering variables was tested for normality and outliers. Hierarchical methods and non-hierarchical methods of k-means cluster analysis were used to identify homogeneous groups. According to Wang and Biddle (2001) and Carr (2006), each method has some disadvantages, therefore it was considered appropriate to combine the two methods.

To identify the cluster, Ward's hierarchical method was utilized in the first stage of the hierarchical clustering

method to identify number of clusters and cluster centers based on the dendrograms and agglomeration schedules. In the second stage, the number of cluster and cluster centre identified in hierarchical methods were applied into the non-hierarchical methods (*k*-means cluster). Thus, non-hierarchical methods were used to verify the results of the hierarchical methods as suggested by Hair et al. (1998). Then, the stability of the cluster solution was tested by re-clustering the data using two-thirds random sample (Hair et al., 1998). A criterion z-score of  $\pm 0.5$  was adopted (Hodge and Petlichkoff, 2000; Wang and Biddle, 2001) and each cluster group were examined and classified accordingly, as 'low', 'moderate' and 'high' in goal profiles.

MANOVAs were conducted to examine the effect of different goal profiles on mental toughness and performance outcome. Tukey *post-hoc* test was used to locate the difference when the goal profiles revealed a significant main effect. Chi-square ( $\chi^2$ ) test was adopted to identify whether any significant difference existed between the medallist and non-medallist as a function of goal profiles. The independent *t*-test was used to compare the mean difference between the medallist and non-medallist, in the mental toughness variables.

## Results

### Descriptive statistics

Means standard deviations and Cronbach's alpha for entire sample are presented in Table 1. Positive correlations were observed between goal orientation (task and ego) with subscales of mental toughness (Table 2). The correlation between task and ego ( $r = .36, p < .05$ ), task and motivation level ( $r = .45, p < .05$ ), task and positive

**Table 2. Inter-correlations between goal orientations and mental toughness (n = 40).**

	1	2	3	4	5	6	7	8	9
1. Task	1								
2. Ego	.36	1							
3. Self-confidence	.10	.05	1						
4. Negative Energy Control	.25	.40 *	.36 *	1					
5. Attention Control	.12	.28	.03 *	.31	1				
6. Visualization & Imagery	.29	.28	.58 **	.27	.19	1			
7. Motivational Level	.45 *	.27	.48 **	.41 **	.16	.63 **	1		
8. Positive Energy Control	.54 *	.05	.49 **	.20	.09	.56 **	.62 **	1	
9. Attitude Control	.36	.07	.67 **	.46 **	-.09	.47 **	.60 **	.56 **	1

\* $p < 0.05$ ; \*\* $p < 0.01$ .

**Table 3.** Means, standard deviation and *z*-scores for three clusters solution by *k*-means cluster analysis.

Cluster	n	Task			Ego		
		M	SD	z	M	SD	z
1. High-task/Moderate-ego	11	4.39	.29	1.13	3.27	.45	.20
2. Moderate-task/Low-ego	9	3.64	.25	-.46	2.26	.39	-1.27
3. Moderate-task/Moderate-ego	18	3.63	.25	-.44	3.48	.37	.44

energy control ( $r = .54, p < .05$ ), task and attitude control ( $r = .36, p < .05$ ), ego and negative energy control ( $r = .36, p < .05$ ) were moderate, but significant.

### Age, gender and competitive experience

Previous research has indicated differences in goal orientations between gender and individuals of different ages (e.g., Newton and Duda, 1993; Petlichkoff, 1993; White and Zellner, 1996). However, Cumming et al. (2002) reported no differences across ages, gender and competitive standards in their study. In this study, separate MANOVAs were conducted to determine whether any differences occurred across age, gender and years of competitive experiences. No significant age differences among the participants (Pillai's Trace = 0.32,  $F_{9, 26} = 1.36, p = 0.258, \eta^2 = 0.32$ ), between the gender (Pillai's Trace = 0.40,  $F_{9, 26} = 1.94, p = 0.091, \eta^2 = 0.40$ ) and years of competitive experiences (Pillai's Trace = 0.37,  $F_{9, 26} = 1.66, p = 0.149, \eta^2 = 0.37$ ) were found. Therefore, the data were collapsed across age, gender and year of competitive experiences.

### Goal profiles

To identify the different clusters based on task and ego orientation scores, goal profiles were generated using a combination of hierarchical method and non hierarchical *k*-means cluster analysis (see Hodge and Petlichkoff, 2000; Wang and Biddle, 2001). All variables were standardized using *z*-scores as a standard procedure of cluster analysis. Two cases in this sample were detected as outliers ( $|z\text{-scores}| \geq 3.00$ ) and were deleted from further analyses. Using dendrogram and agglomeration schedule from the hierarchical method of cluster analysis, a three-cluster solution was found suitable. Additional analysis using *k*-mean clustering method showed that there were lack of participants in each profile group from four-cluster and five-cluster solutions and the lack of significant difference among the two-cluster solution indicated that the three-cluster solution was the most robust. The stability testing on the three-cluster solution was done using two-thirds random sample. The re-cluster analysis indicated a stable cluster pattern, with approximately 88.5% of participants maintaining their original cluster membership.

The final clusters identified were high task and moderate ego (HT/ME), moderate task and low ego (MT/LE) and, moderate task and moderate ego (MT/ME) (Table 3).

### Goal profile and mental toughness

Table 4 illustrated the mean and standard deviation of the dependent measures in each group profiles. The results show that athletes in cluster 1 high-task/moderate-ego scored higher mean on five variables viz. negative energy control, visualization and imagery control, motivational level, positive energy control and attitude control. To determine the effect of goal profile on the fundamental areas of mental toughness, MANOVA was done. The results revealed significant multivariate effect for goal profile on the dependent measures (Pillai's Trace = 0.62,  $F_{14, 60} = 1.94, p = 0.039, \eta^2 = 0.31$ ). Further univariate analyses revealed significant results for the negative energy control ( $F_{2, 35} = 5.81, p = 0.007$ ) and positive control energy ( $F_{2, 35} = 3.60, p = 0.038$ ). Tukey *post-hoc* tests indicated that Wushu athletes with high task and moderate ego (cluster 1) scored significantly higher on negative energy control than athletes in moderate task and low ego (cluster 2) ( $p = 0.005$ ). Furthermore, athletes in high task and moderate ego (cluster 1) also scored significantly higher on positive energy control than athletes in moderate task and moderate ego (cluster 3) ( $p = 0.035$ ).

In order to examine whether successful performance outcome in competition was a function of goal profiles, Chi-square ( $\chi^2$ ) test was adopted. No significant differences were found among athletes with different goal profiles and medallist status,  $\chi^2 = 0.98, p = 0.612$ . This indicated that successful outcome at the competition were not merely a function of goal profiles. Further to determine whether mental toughness variables had any influence on successful performance outcomes, we performed univariate *t*-test between medallist and non medallist. The results indicated a significant difference between medallist and non medallist in self-confidence ( $p = 0.001$ ) and negative energy control ( $p = 0.042$ ). The medallist scored significantly higher on self confidence (mean = 21.82, SD = 2.72) and negative energy control (mean = 19.59, SD = 2.32) than the non medallist (self confidence-mean = 18.76, SD = 2.49; negative energy control mean = 18.14, SD = 1.91).

**Table 4.** Mean and SD of three clusters based on group profiles.

Mental toughness (Fundamental areas)	Cluster 1		Cluster 2		Cluster 3	
	High-task/Moderate-ego		Moderate-task/Low-ego		Moderate-task/Moderate-ego	
	M	SD	M	SD	M	SD
Self-confidence	20.25	3.39	19.56	2.56	20.35	3.04
Negative Energy Control	19.92	1.17	17.00	2.18	18.94	2.25
Attention Control	19.00	1.54	18.11	2.03	19.00	2.06
Visualization and Imagery Control	20.75	3.31	18.22	1.72	18.94	3.29
Motivational Level	22.25	3.60	19.11	2.85	19.65	3.39
Positive Energy Control	22.33	2.74	20.33	2.45	19.94	2.19
Attitude Control	21.17	1.99	19.89	2.21	19.24	2.61
Overall Mental Toughness	145.67	11.63	132.22	10.10	136.06	13.05



## Discussion

This study offers findings of goal orientations and its influence on mental toughness and successful outcome among Wushu athletes. Understanding the relevance of mental toughness in competitive sport domain is a research focus today. Most work on goal orientations has been associated with motivation, as the central concern. Competitive situations depict achievement behaviour, and we believe that mental toughness is imperative for sustaining in competition. We examined the goal profiles of athletes, how they differ in their dispositions, and what variations are manifested in the fundamental areas of mental toughness. More specifically, we determined if different goal profiles showed any significant effects on mental toughness and performance outcome.

Our findings showed significant effects for mental toughness among different goal profiles in the two fundamental areas i.e., negative energy control and positive energy control. We consider, that the athletes in cluster 1, (high task and moderate ego-HT/ME) had greater mental resources in controlling negative energy than the athletes in cluster 2 (moderate task and low ego-MT/LE) and in positive energy control when compared with cluster 3 (moderate task and moderate ego-MT/ME). Results also suggest that it is possible that athletes in cluster 1 would probably benefit during adversities in competition, due to good control over oneself, leading to greater mental toughness. Furthermore, athletes in cluster 1 (high task and moderate ego) probably invested more in task orientations, focusing on gaining mastery over the skill to perform and thus learned to exert control over negative energies. Benefits from having better control over unproductive negative energy, are likely to result in positive competition outcomes. These findings support the suggestions by Hodge and Petlichkoff (2000) that moderate to high task and ego orientation pattern can be complimentary in a competitive situation.

Nicholls (1989) indicated that the two achievement goals namely task and ego relates to the competence level and success is subjectively defined. Thus interpretation of successful performance outcome in competition could be very different for different individuals. Some suggestions are made regarding what goal profiles are most adaptive for success in competition, for example, Hodge and Petlichkoff (2000) indicated that moderate task/high ego profile resulted in a perception of better physical abilities and concluded that moderate to high task and ego orientation may better adapt in a competitive sport context. Duda (1997) suggested that both high task and high ego goals may represent achievement oriented profile. Duda (1997) further indicated that athletes with high task and high ego orientation would have better opportunities for success. In similar lines, Duda and Treasure (2001) suggested that individuals with high task and high ego orientations would be better adapted to meet the demands of competition. The findings of this study show that, athletes with successful performance outcome in competition did not fall into any particular goal profiles. This indicated that a particular cluster combination of task and ego orientations does not necessarily ensure successful outcome.

Thus, goal profile does not automatically influence performance outcome.

Significant relationships were observed in the area of mental toughness when medallist and non medallist were analyzed. The medallist displayed better self-confidence and better negative energy control than the non medallist. This is a research area that warrants further elaboration. In a somewhat similar study done by Kuan (2007), which aimed to explore relationships between mental toughness and the social position of athletes, in different team sports of Malaysia (n = 203), the results suggested that the athletes with greater mental toughness were more likely to be selected into main team, to play in crucial competition.

The limitations of the study, especially in including medalling as a variable, should be recognized. This study is a preliminary investigation to examine the differences in mental toughness and performance outcomes based on individual's goal orientations. The study is restricted to intervarsity level Wushu athletes of Malaysia only, and extensions of the study with larger samples and elite competitive levels are needed to yield results that can be generalized.

## Conclusion

In conclusion, athletes with high task /moderate ego goal profile scored significantly higher on negative energy control and positive energy control. Successful performance outcome in competition were not a function of goal profile. The medallists scored significantly higher on self confidence and negative energy control than the non medallists.

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## Key points

- Mental toughness can be influenced by certain goal profile combination.
- Athletes with successful outcomes in performance (medallist) displayed greater mental toughness.

## AUTHORS BIOGRAPHY



### Jolly ROY

#### Employment

Lecturer in Sport Psychology, Sports Science Unit, Universiti Sains Malaysia

#### Degrees

MA (psy), MSW(psychiatry), PhD

#### Research interests

Social psychology, mental toughness, performance related emotion.

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### Garry KUAN

#### Employment

Trainee Lecturer in Sport psychology, Sports Science Unit, Universiti Sains Malaysia

#### Degrees

BSc, MSc-(Sports science)

#### Research interests

Motivation, mental toughness, group cohesion, music in sports training.

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### ✉ Jolly Roy, PhD

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