

Factorial Construction of Multi-Dimensional Self-Motivation for Athlete

Ayman Mostafa Taha and Hend Soliman Aly

Sport psychology Department, Faculty of Physical Education for Men,
Helwan University, Cairo, Egypt

Abstract: This study aims to study the construction of multi-dimensional self-motivation for athletes through analysis of the content of motivation theories and its relationship with the self dimensions and asking the experts and specialists. The curriculum has been used was a descriptive style survey and the Meta analysis method of previous studies which are related to self dimensions and motivation traits in sports activity. Dimensions and items were determined to build multidimensional self-motivation scale for athletes, which had been applied to the research sample of the players who were selected randomly from players of various sports activities. 160 players were used to calculate scientific psychometrics for the scale with Criterion correlated validity, internal consistency validity, discrimination validity, factorial analysis validity and addition to calculate the reliability through the split half method and alpha factor method. The significant results of factorial analysis declared the most important factors that explain the nature of the construction multidimensional of self-motivation for athletes.

Key words: Factorial construction % Self-motivation % Psychometric % Scale % Measurement % Sport psychology % Instrument

INTRODUCTION

The father of humanistic psychology was Abraham Maslow (1954), who offered a rather common sense theory of different types of motivation and the link between them. He suggested hierarchy of needs and represented these needs in the form of a pyramid. Basic needs, such as physiological needs for food; water and safety, were located at the base of the pyramid as essential to human existence. Although love and esteem were less essential for survival, but important for psychological well being, were located further up the pyramid. Finally, the need for self-actualization [1].

Several scientific theories of motivations confirmed that there is a strong relationship between achievement motivation and goal orientation, which is linked directly with the self-determination. Self-determination theory confirms that intrinsic motivation is one of the important factors that affect the motivation to success [2, 3]. It is linked to the needs and feelings inherent to the individual and self-realization in the surrounding environment, where enjoyment deemed one of the natural motives that every

individual seeks. Intrinsic motivation is the most effective and stable forms of motivation [4]. In most cases, intrinsic and extrinsic motivations work together, but with varying degrees of influence. When self motivation of the individual is the main source of exercising certain activity, the possibility of continuity that activity is relatively high [5]. Intrinsic motivation aims to achieve the satisfaction and happiness. There are three major in contrast components for intrinsic motivation: to know, to accomplish and to experience [6]. On the other hand extrinsic motivation aims to win the award, which includes performing tasks with specific value until the completion of the task.

Cognitive evaluation theory showed the interactive relationship between intrinsic motivation and self-determination [7, 8] as showed in the following Table 1.

Thus, the achievement goal theory also emerged during the last fifteen years, as one of the basic theories associated with achieving motivation in sports and physical activity [9]. In this theory, achievement motivation is the most important aspect in the motivation

Table 1: Cognitive evaluation theory

Intrinsic motivation	High	Low
Need to		
Self determination	Rewards that do not control	Rewards that control
Feel competent	Rewards signaling high competence	No rewards signaling low competence

(Coded by Jefferies [7])

system for the athlete because it results from the achievement of personal goals that define success. Goal orientation is based on task and ego to achieve success when participating in physical activity. In addition to the effort done by athletes in order to achieve tasks assigned to the training and competition as well as perseverance in the face of failure and a sense of pride when completing those duties and tasks [10].

Furthermore, achievement goal theory is based on the relationship between goal-orientation and ability recognition. Only few studies examined the relationship between goal-orientation and physical ability of self-concept (PASC), where PASC seems as a synonym for sports in general [11]. The perception of the individual to the general physical efficiency shows a level of stability and consistency, depending on the situation. However, the term self-concept is usually used interchangeably with self-esteem to describe, evaluate and identify the self-effect in particular. Furthermore, self-concept can also be recognized as an integrated building, showing self-awareness which leads to the emergence of many variables such as physical self-concept, academic self-concept and the social self-concept [12].

On the other hand, Abdou and Osman [13] reported that self-concept is a spiritual region to a determined belief about self; it is also a key and important factor in controlling human behavior. Hence, self concept is considered a barometer that reflects the personality as well as the nucleus of personality as a complex dynamic unit. Usually the term self is used in two senses: self-reaction which means person's trends and feelings about himself and explained the self as a theme. On the other

hand, self concept reflects on the psychological operations, which control behavior and compatibility, which explains the self as a process [14].

The importance of the positive self-concept to physical activity practitioners represented in the nature of the sports field may create a position reaction in clashing with the self and the past experience affecting the practitioner and the level of performance, referring to the belief of the individual in his abilities and specific performance, i.e. the individual's belief or perception in his efficiency and if he can succeed in the performance of the specific behavior, that look like a cognitive process in which a person formed a judgment or self-perception of his abilities to meet certain requirements, as they affect both the achievement motivation and achievement behavior with the three aspects choosing, intensity and perseverance [15].

The purpose of this study was to identify the relationship between motivation and the self dimensions using factorial construction. Research Objectives were:

- C Building multi-dimensional self-motivation scale for athletes.
- C Studying factor construction of multi-dimensional self-motivation for athletes.

MATERIALS AND METHODS

Participants and Procedures: One hundred and sixty athletes were randomly selected from the union sports teams of individual and group games which represent major sports classifications.

Table 2: Demographic data

Properties	Unit	Sample					
		Male Players (N=108)		Female Players (N=52)		Total (N=160)	
		Mean	SD	Mean	SD	Mean	SD
Age	year	18.28	1.89	20.86	5.24	18.58	2.58
Height	cm	177.08	12.69	161.24	10.33	168.62	11.96
Weight	kg	76.84	6.25	66.74	5.88	77.05	6.53
Training experience	year	1.95	1.33	3.71	2.14	2.13	1.53

Table 2 shows the demographic data for sample, the gender distribution of the sample was 67.5% males and 32.5% females. The distribution of the level of practice for the group was as follows: The seven levels of exercise for the study sample may be distributed to Youth League 6%, the First National League 11%, Arab league 19%, Regional League 31%, African League 18%, Global League 13% and Olympic players 4%.

Sixty out of the 160 subjects participated in the pilot study to establish the internal validity and reliability of the questionnaire. 100 subjects participated in establishing the factorial analysis and normative data for the Multi-Dimension Self-Motivation scale.

Design and Materials:

- C Studying and analysis of scientific theories associated with the dimensions of self-motivation in sport psychology.
- C Review of psychometric assessment and analysis of previous studies associated with the study subject.
- C Survey of nine experts in sports psychology with an exploratory open-ended question about the dimensions of self-motivation for athletes.
- C Based on the analysis of the published psychometric assessment tools and the input collected from the nine experts, we designed a scale that contains the major components of the multi-dimensional self-motivation for athletes.
- C The same nine experts gave their input about the relative importance of every dimension on the constructed scale.
- C The experts' input was analyzed to determine the degree of agreement and the internal validity of the proposed scale.
- C Based on the results of the experts' input analysis, the scale was modified and administered to the pilot participants (60). Data from 30 of the pilot participants were used to establish the internal validity of the scale while data from the other 30 was used to establish the scale reliability.
- C The scale was then administered to the rest of the participants (100 players) to establish the normative data.

Statistical Analysis of the Pilot Data: Descriptive statistics including mean, standard deviation, variation coefficient and percentage were done for the pilot data as well as the experimental. Pearson correlation coefficient, paired t-test, analysis of variance, factor analysis and

normative data distribution were applied using the Statistical Package for Social Sciences Program (SPSS). Alpha of 0.05 was selected for all results.

RESULTS AND DISCUSSION

Validity Scale

Content validity: The degree of agreement between the experts on the dimensions of the proposed measure ranged from 88% to 100% (which is greater than the 80% level identified by the researchers to accept a key dimension of the multi-dimensional self motivation scale for athletes). The only exception was the dimension of persistence motive which scored only 77% level of agreement, thus deleted from the scale.

The value of Chi square was 19.9 which was statistically significant value at the ($p < 0.05$), indicating that the sample of experts had agreed on the proposed dimensions of the multidimensional self-motivation scale for athletes after making the appropriate adjustments to those dimensions.

Also there was an agreement among the experts on the proposed items of the scale, where approval rates on proposed items ranged between 88%-100%.

The Internal Consistency: Correlation coefficients between the items of each dimension ranged from 0.61 to 0.83. All correlation coefficients were statistically significant ($p < 0.05$) and all of which fulfill the conditions of internal consistency with the overall degree.

Discriminate Validity: Comparing terminal validity was used to ensure the ability of the scale to distinguish between the upper and lower quartile of the first pilot data ($n=30$) as shown in table 3.

The T value of 7.77 was statistically significant which indicates the sensitivity of the scale to distinguish between two different groups in the level of self-motivation for the athletes and this reflects the internal consistency of the scale.

Reliability Scale

Reliability Scale (by Split-half method): Data collected from the second 30 pilot participants was used to calculate reliability coefficients by using Split-half method, which reflects the internal consistency validity, as shown table 4.

The validity coefficients of the scale by split-half method, Spearman-Brown 0.862 and Guttman coefficient 0.859, reflect high reliability of the scale.

Reliability Scale (by the test retest method): Test-retest with a time lag of 13 days between tests was applied to the other half of the pilot participants (30 players).

The correlation coefficients of the repeated tests of all items ranged between 0.69, 0.89, while the correlation coefficient of the scale as a whole was 0.85. All correlation coefficients were statistically significant ($p < 0.05$), which reflects high reliability of the scale.

Reliability Scale (using Cronbach alpha coefficient): The researchers used the data collected by the application of the scale in its third form on a sample of 30 female and male athletes to calculate the Cronbach alpha coefficient of the dimensions, which reflects the reliability of the scale and internal consistency.

Correlation coefficients of the dimensions of the scale have ranged between 0.332-0.814, while the value of the total degree of the scale as a whole ranged between 0.735-0.868. All correlation coefficients were statistically significant $p < 0.05$, which indicates that there is statistically acceptable internal consistency. The values of Cronbach alpha coefficient for the individual dimensions ranged between 0.645-0.817 and all values were statistically significant ($P < 0.05$) and all of them are less than the value of Cronbach alpha of the scale as a whole which was 0.879. This reflects the internal consistency of the scale.

Reliability Scale (by interclass correlation Coefficient): Two way ANOVA was also used to examine the scale reliability and its results are presented in table 5.

The interclass correlation coefficient was 0.879, which indicated a small error in the scale.

Results of Scale Application: The researchers used factor analysis (Factor Validity) method to select the similar items for the self-motivation scale. The diagonal correlation coefficients matrixes for the items included 3486 correlation coefficient; 672 were negative and the remainder 2814 were positive. Significant correlations ($p < 0.05$) were seen in 785 items (22.52%) of the total number of inter-class correlation coefficients, which refers to the existence of correlated clusters between these items of the proposed scale.

Table 6 shows the comparison of the results of factor analysis (Factor Validity) after orthogonal rotation for the scale items.

The table 6 shows the factor analysis after orthogonal rotation resulted in 25 factors from which 10 factors were accepted according to the Kaiser rules.

The correlation variance of the derived factors in accordance with the sum of the Eigen value of the factors had reached 84.06%, which represented the maximum correlation variance that can be drawn from the correlation variance matrix, where this percentage is acceptable and in accordance with the views of psychological scientists measurement in the factor research.

Interpretation and Discussion the Results: Orthogonal factor analysis aimed to separate the factors from each other to determine the acceptable terms to each factor in a descending order by the value of the factor loading coefficient so each factor can be interpreted in light of the psychological aspects as follows:

- C We accepted the factors which have at least three saturated items in the component matrix.
- C We identified the psychological traits that indicate the factors and show the principal components of each psychological factor. We deleted all factors with loading coefficients less than 0.5.

According to the orthogonal analysis we interpreted and labeled 10 factors, which serve as a simple factor construction to measure of multidimensional self-motivation for athletes. The following is the interpretation of the accepted factors:

Factor # 1: According to the orthogonal analysis and the loading coefficient, items # 25, 38, 39, 26, 47, 37, 81, 43 and 80 are related and arranged in a descending order according to the values of the loading coefficient factors. The descending order of the factor loading coefficient items for the first factor ranged between 0.776-0.488, which confirms the acceptance of the factor. Through the analysis of the psychology structure of the items, it was clear that they were all related to the psychological aspect of self dimensions and self confidence, so the proposed label for this factor is "Self-Confidence ". We suggested using items 25 and 38 for the short version of the scale.

Factor # 2: The results of the orthogonal analysis showed that items 67, 68, 69 and 70 are related and arranged in a descending order according to the values of the loading coefficient factors. Descending order of the factor loading coefficient items for the second factor, ranged between 0.849-0.533, which confirms the acceptance of the factor. and interpreted in the light of common default psychological aspects, representing the acceptable items

in accordance with its factor loading coefficient values of the second factor. Through the analysis of the psychology structure of the items, it was clear that they were all related to the psychological aspect of self dimensions of affiliation and citizenship, so the proposed label for this factor is "Affiliation ". We suggested using items 67, 68 and 69 for the short version of the scale.

Factor # 3: The following four items: 40, 3, 29 and 27 were related and arranged in a descending order according to the values of the factor loading coefficient factors. The descending order of the factor loading coefficient items for the third factor ranged between 0.799-0.529, which confirms the acceptance of the factor. Through the analysis of the psychology structure of the items composition, it appeared that they all are related to the psychological aspect for the self-perception of achievement motivation. So the proposed label for this factor is "Achievement Desire". We suggested using items 29 and 27 for the short version of the scale.

Factor # 4: The results orthogonal of factor analysis showed that sectarian factor is seen by the factor loading coefficient of the 5 items 16, 51, 73, 60 and 74 in descending order according to the values of the loading coefficient factors. the loading coefficient items for the fourth factor ranged between 0.845-0.457, which confirms the acceptance of the factor. Through the analysis of the psychology structure of the items composition, it was clear that they are related to the psychological aspect of self-criticism and award motivation. Thus the proposed label for this factor is "Self-Award". We suggested using item 74, for the short version of the scale.

Factor # 5: The results orthogonal of factor analysis showed that sectarian factor is seen by the factor loading coefficient of the 4 items, which are the best explained items (48, 72, 63 and 58) in descending order according to the values of the loading coefficient factors. Descending order of the factor loading coefficient items for the fifth factor, ranged between 0.766-0.370, which confirms the acceptance of the factor. The selected items refer to the general property of self-dimensions and the self-reliance, thus the proposed label for this factor is "Self-Reliance ". We suggested using item 58, for the short version of the scale.

Factor # 6: For this factor items 10, 22 and 42 were related according to the loading coefficient in a descending order. The descending order of the factor loading coefficient items ranged between 0.803-0.360, which confirms the

acceptance of the factor. The analysis of psychology structure of the items composition, referred to perception of others, adequacy motivations, challenges and success perception. We proposed the label "Adequacy Perception" for this factor. We suggested using items 10 and 22 for the short version of the scale.

Factor # 7: In this factor, the following 3 items were related, 5, 45 and 24. The descending order of the loading coefficient ranged between 0.800-0.561, which confirms the acceptance of the factor. These three items refer aspect of self-criticism, challenges and adequacy motivations and ability, thus we decided to label this factor as "Self-Criticism ". We suggested using item 24 and 45 for the short version of the scale.

Factor # 8: The results orthogonal of factor analysis showed that the following 4 items are related: 54, 33, 18 and 1 in a descending order according to the values of the loading coefficient factors, which ranged between 0.647-0.471. The psychological interpretation of these items refer to some aspects of self-dimensions and different motivations. We couldn't find a logical interpretation of the association between these items; therefore we rejected this specific factor.

Factor # 9: The results orthogonal of factor analysis showed that items 11, 75 and 66 are related and arranged in descending order according to the values of the loading coefficient factor. The descending order of the items ranged between 0.734-0.382, which confirmed the acceptance of the factor. The psychological interpretation of these items referred to aspects of self-dimensions and different motivations. We couldn't find a logical interpretation of the association between these items; therefore we rejected this specific factor.

Factor # 10: For this factor, items 44, 62 and 79 were related and arranged in a descending order according to the values of the loading coefficient factor, which ranged between 0.793-0.368 confirming the acceptance of the factor. The interpretation of the psychology structure of the items composition showed that they are related to ideal-self and some motivation dimensions, so we proposed the label factor "Ideal Effort" for this item. We suggested using item 79 for the short version of the scale.

The Final Form of the Scale: The table 7 shows the distribution of the multi-dimensional self-motivation scale items of the accepted factors for measuring multi-dimensional self-motivation for athletes.

Table 3: Significant statistical differences between the upper and lower quartile of the first pilot sample on the scale

multidimensional self-motivation scale	Upper Quartile		Lower Quartile		Mean difference	t	Z
	Mean	SD	Mean	SD			
	218.44	12.27	176.54	11.83	41.86	* 7.77	*2.64

* Values of "t" and "z" is statistically significant at the level 0.05

Table 4: Scale reliability by Split-half method

Scale Items	as a whole		odd words		Even words		split-half Correlation	Spearman-Brown coefficient	Guttman coefficient
	Mean	SD	Mean	SD	Mean	SD			
84 items	341.67	28.47	172.23	14.59	0.757	14.92	0.757	0.862	0.879

(n₂ =30)

Table 5: Reliability by interclass correlation Coefficient

Source of variation	Sum of squares	The degree of freedom	variance	F	Reliability coefficient
Variances between individuals	1356.626	29	46.780	1.04	0.879
Variances between items	488.085	83	5.881		
Interaction between individuals	13627.617	2407	5.662		
Variances among individuals (errors)	14115.704	2490	5.669		
Total	15472.330	2519			

* F value is statistically significant at the level 0.05

(n₃=30)

Table 6: The results of factorial analysis after orthogonal rotation for the scale items

After orthogonal rotation with deleting unacceptable and zeros factor loadings coefficient less than 0.3

Numbers of acceptable factor loading coefficients items

Factors	Large coefficient	Medium coefficient	Small Coefficient	Eigen value	% of Variance
1	2	5	2	5.80	6.90
2	2	1	-	4.49	5.34
3	2	1	1	4.08	4.68
4	1	2	1	3.67	4.37
5	1	2	1	3.17	3.77
6	2	-	1	2.93	3.48
7	2	1	-	2.79	3.33
8	-	2	2	2.75	3.28
9	1	-	2	2.70	3.21
10	1	-	2	2.69	3.20
Total	-	-	-	70.61	84.06

Table 7: The multi-dimensional self-motivation scale

Numbers of acceptable factor coefficient items on scale factors

Scale Dimensions	large factor coefficient 0.7	Medium factor coefficient 0.5	zero factor coefficient 0.3	Total of long-scale items
1-Self-confidence	38, 25	37, 47, 26, 39, 81	80, 43	9
2-Affiliation	69, 68, 67	70	-	4
3-Achievement Desire	29, 27	3	40	4
4-Self-Reward	74	73, 60	16, 51	5
5-Self-Reliance	58	72, 63	48	4
6-Adequacy Perception	22, 10	-	42	3
7-Self-Criticism	24	45	5	3
8-Ideal Effort	79	-	44, 62	3
Total	13	12	10	35

Table 8: Correlation coefficients matrix between the scale dimensions

dimensions	2	3	4	5	6	7	8	Total
1	0.343	0.480	0.308	0.400	0.351	0.304	0.458	0.795
2		0.383	0.316	0.317	0.311	0.315	0.302	0.570
3			0.360	0.451	0.406	0.311	0.353	0.749
4				0.239	0.386	0.388	0.289	0.516
5					0.371	0.248	0.422	0.681
6						0.246	0.441	0.611
7							0.332	0.477
8								0.629

Table 9: Descriptive statistics for research sample on multidimensional self motivation scale for athletes

Scale Dimensions	# of items	Mean	Std. Deviation	Coefficient of variation
1-Self-confidence	9	38.95	4.938	12.68
2-Affiliation	4	18.73	2.204	10.80
3-The desire to excel	4	16.12	3.037	18.84
4-Self-reward	5	18.40	2.345	12.74
5-Self-reliance	4	14.53	3.347	23.03
6-Feel competent	3	12.27	2.162	17.62
7-Self-criticism	3	11.28	2.084	18.47
8-Ideal effort	3	13.57	1.678	12.63
Total	35	143.57	14.217	9.90

(n=100)

Table 10: Multi-dimensional self-motivation scale levels for athletes

Raw score	Standard T-score	Percentile score	self-motivation level
35-70	1.54-17.92	20%-40%	Fair
71-105	18.93-43.30	41%-60%	Less than average
106-130	34.76-45.99	61%-74%	Average
131-158	46.46-59.10	75%-90%	High
159-175	59.56-67.05	91%-100%	Very high

As shown in Table 7, the multi-dimensional self-motivation scale for athletes, has a total of 35 items that are distributed into 8 major dimensions representing the long form of the scale. The short form of the scale is composed of 13 item that are distributed on the same dimensions of the long form of the scale.

The Independence of the Scale Dimensions: The table 8 shows the correlation coefficients matrix between the main dimensions of the multi-dimensional self-motivation scale for athletes:

As shown in Table 8, the correlation coefficients matrix for the key dimensions of the multidimensional self motivation scale for athletes, ranged between 0.246-0.458, while the correlation value between the dimensions and the total degree of the scale ranged between 0.477-0.795. All values were statistically significant at 0.05, which indicates the degree of consistency between the main dimensions on one hand and it's independent from each other on the other hand. In addition, there was a strong correlation of the total of the scale as a whole.

These results have fulfilled the purpose of the study and provided the psychological variables that represented the multi-dimensional self-motivation for athletes.

Standards and Levels of Scale: The researchers applied the scale in its final form on a sample of 100 players of both sex in order to build the standards and levels of the scale. Table 9 shows the mean values, standard deviation and variation degrees of the basic study sample on the key dimensions and the total degree of the scale.

It is clear from Fig. 1 that the values of variation coefficient of the dimensions of self-motivation scale multi-dimensional for athletes are range between 9.90 to 23.03 and this Reflect the homogeneity of the research sample, the independent of scale dimensions and the equality of Scale dimensions in relative importance which measure the sport psychological aspect within the standard Multi-dimensional self-motivation for athletes.

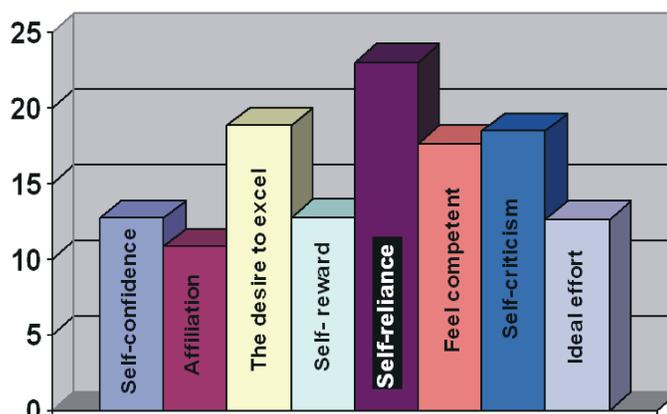


Fig. 1: Coefficient of variation for multimensional self motivation scale

The Estimated Levels of the Scale: We used the data collected by the application of the scale in its final form on the basic study sample in order to build scale standards by calculating the standard T-scores and percentile scores of the raw data of the scale. Table 10 shows that the raw data and the normative scores were distributed on five estimated levels reflecting the self-motivation for the athletes through their response to items of multi-dimensional self-motivation scale.

CONCLUSION

- C This study identified the properties of the simple factor structure motivation of multi-dimensional self-motivation scale through the emergence of factorial groups reflected on the factors to a sectarian the general factor. These factors were used as principal dimension in measuring the self-motivation for athletes.
- C Ensure the psychometric properties of the scale by estimating the coefficient of validity by using different methods which are: the content validity for the arbitrators, the validity of internal consistency, validity of discrimination between the opposing groups and factorial validity. As well as ensure the reliability of the scale by using the following methods: test and re-test of the scale, Split-half method, Cronbach alpha coefficient and factional internal consistency coefficient. All values were statistically significant at 0.05.
- C Building T-scores and percentile scores as well as the standard table and the estimated levels of the raw scores on the multi-dimensional self-motivation scale for athletes.

Recommendations: Conducting research based on the application of multi-dimensional self-motivation scale for athletes, for comparison purposes in the light of demographic and geographic changes.

Implementation: Interest in using dimensions when planning for psychosocial programs of athletes, in order to increase the level of self-motivation, contributing to the upgrading of the level of performance and sports achievements.

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