

Structural Relationship of the Mental Toughness on Athletes' Success in Thai Contact Sport

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Abstract

Mental toughness (MT) is an ability in controlling and responding to properly mind of moods, concentration, commitment and attention in various situation. Originally, foreign countries have studied it continually and sequenally for understanding of their appropriate structures explaining of athlete mental toughness and a success in a sport, especially in the professional or champion's level of sport. For Thai athletes, an extending of this knowledgeable to deeply and specify is undoubtedly important and needs to be continued as well, such as a contact event of sport. The objectives were to examine the MT structural relationships on athlete success and analyze their norm scores for Thai contact sport athletes. The samples were screened for 917 from the whole sample of 2,030 Thai athletes who were participated in the National Games and were Thai athletes' representative. There were youth males (65.0 %), and females (35.0 %) from other one previously study by the authors (Choosakul and Julavanichpong, 2014). They were chosen through random sampling. The sample size was specified by considering at the lowest test's criteria of structural relationships and invariance of mental toughness, 20 times more items than those in the inventory (Tabachnick & Fidell, 1996). The tools used in this study were MT Inventory (MTI) (Middleton, 2005a) and Athlete Success Inventory (ASI) (Choosakul and Julavanichpong, 2014), both had been proved as good content and construction validities and reliabilities. The data was analyzed by basic statistics including mean, standard deviation, and percentage for presenting any basic data. Structural equation modeling (SEM) technique was employed for the measurement of Thai contact sport athletes' MT and relation of the success in sport. Fit Indices were used X^2 , CFI, TLI, RMSEA, path coefficient, df , df_{diff} and X^2_{diff} for appropriate and coherent data analysis of the model. Finally, T-score and percentile was used for inspecting Thai contact sport athletes norms of MT ability. The research results found that the MTI shown it concurrent criterion-related validity and could predict the athletes' MT for Thai contact sport athletes by the model fit indices ($X^2= 4,347.60$, $df = 548$, $p = .00$ CFI = .98, TLI = .98,

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RMSEA = .069 and RMSEA = .069, (3). Norm scores of the Thai athletes' MT for Thai contact sport athletes was found in both of the whole and separated group of the factors of MT. In conclusion, the MTI was a strong measure and effective. In terms of reliability, construct validity, concurrent validity that could be predicted and measured the success for Thai contact sport athletes, which was very important to develop their mental ability to a success in the future.

Keywords: Mental Toughness, Structural Relationships, Contact Sport Athletes

Introduction

MT or heart of fighter (Loehr, 1986) is an ability in well controlling of moods, having commitment and attention in competitions. The significance of the mind strength is the ability in controlling responding moods, concentrating, and alerting to the stressful situation in the proper level, not too much or not too less. The athlete with mental toughness is the one who trust their self and can control the stressful situation in an arousing way. This leads to more success rather than the fear of being failed or lost. The fearless of failure thought allows the athlete to concentrate to the game rather than to worry about being not able to do or being blamed for the failure. It is absolutely considered that the MT is very important for practicing and also competing moment; however, the study about this issue is thin in number according to some constraints such as lacking of psychological instrument measuring several psychological standards including reliability, structural validity, predictive and concurrent validity.

Previously, the study in MT conducted

by Loehr (1986) investigated the group of athletes and coaches. They both agreed that at least 50% of the success comes from psychological factors reflecting the mental toughness. Harmonizing to the study of Gould, Hodge, Peterson, & Petlichoff, which reveals that among the coaches they all agree that MT is extremely significant to the progress to achieve the success. In concordance with the study of Norris, (1999) which focuses on the MT in developing athletes to the championship.

The development of the accurate mental toughness level measuring instrument in psychological term cannot be structured according to the lacking of theoretical study in the model, meaning, and the concept of mental toughness. However, practically in the group of professional athlete, Loehr's Psychological Performance Inventory (PPI, 1986) is considered one of the most reliable instruments used in the early testing study in MT. Loehr published the instrument in his first book, "The Mental Toughness" (Loehr, 1986). He operated the instrument to measure 7 significant psychological factors



reflecting the features of the athletes' MT. The factors are Self – Confidence, Negative Energy Control, Attention Control, Visualization/ Imagery, Motivation, Positive Energy, and Attitude Control. Nonetheless, Loehr suggests the inner mind feeling and thought as the instrument, it seems that the information about the ability of psychological process and function of mind or the supporting theory to develop the instrument is still lacking.

MT measuring instrument is steadily developed. However, the scholars pay most attention to MT as the indicator of psychological quality which brings about the champion, the qualitative study is still scarce in this sphere (Gouldberg, 1998; Hodge, 1994; Jones, Hanton, & Connaughton, 2002; Loehr, 1982, 1986). The qualitative study in the feature of MT (Middleton, 2004) conducted under the in depth interview from the experiences of the excellent athletes and their coaches (including 33 subjects receiving gold medal from Olympic Games or world-class-championship competition) to reveal the basic structural component of MT defined by the associated psychological theory and qualitative analysis process. The study shows that the MT means the consistence to sustain, determination, self-composure, endeavor, thoroughness, and the confidence to achieve the forthcoming gold though, there is an exertion to overcome. Conforming to Loehr, MT has several dimensions. There is a development for MTI

based on the concept of 12 components progressively. The result of the development is a 36-question (Middleton et al, 2005a) which is able to measure all of the 12 components. The correlation coefficient reliability of each component is at .82 to .94. The goodness of fit according to CFA analysis also reveals virtuous among the samples.

The studies of Thai sport psychologists in expanding MTI (Julavanichpong, Vongjaturapat, and Julavanichpong, 2010) generated the developed standardized version of the inventory. The instrument includes the questions based on western theory and it will test the appropriateness of the measuring model of the inventory revealing proper value. The value of the size of the relation of the components is between .46 - .99. The structural analysis conforms to the empirical data in an appropriate level. Considering from the chi-square test, the value is equal to 1,658.64 (df = 528) RMSEA value = .057 NNFI index = .977 CFI index = .981 When the data were analyzed separately for each gender. The results of the chi square analysis is equal to 1,276.59 (df = 528) RMSEA value = .058 NNFI index = .974 CFI index = .978. The female shows the chi square value = 1,223.03 (df= 528) RMSEA value = .075 NNFI index = .961 CFI index= .968.

The implementation of the model, however, need to be more obvious and more specific, particularly the study in the



Concurrent criterion-related validity of the inventory. The structural relation of the factors within the structural relation is implementing to define the MT that what factor has more or less influence in indicating the results of MT of the contact sport athletes. The analysis is pointed one of the significant factors by Middleton et al. (2005b). This is consistent with the evidence showing the sport athletes' psychological quality influencing the MT components. (Pattanamontree, 2009; Sinonyang, 2009; Nicholls, Polman., Andrew., & Susan, 2009). The factors also related to performance of the abilities and behaviors such as motivation in sport playing of the athletes in different sport (Kumnil, 2000; Trakulkittipaisal, 2003; Boonnark, 2005; Boonseem, 2007; Ratnatewat, 2007), and cognitive anxiety (Sukdee, 1990; Petchsurasi, 1999; Chaumpong, 2002; Juntabut, 2004; Monica, et al. n.d.; Sonstrom & Bernado, 1982; Passer, 1983). The previous scientific evidences illustrate the consideration of the contact sport athletes' psychological quality as a significantly concerned aspect in this study. The conducting of the study leads to more specific and more obvious data for the implantation. Concordantly, the study of Middleton et al, (2004b) and Julavanichpong et al (2010) suggests the simultaneous investigation for the predictive validity of the MTI. The investigation is to find out the resolution of the inventory in predictive validity of the MTI and the suggestion about the structural relation of the MT factors collectively (Middleton et al., 2005b). To

follow the study by whole research project of MT with Thai athlete populations were presented and supported by gender consideration (Choosakul and Julavanichpong, 2014). The lacked of previously study in focusing the explanation of the MT of Thai contact sport athletes is chanced to be done before an application the idea of MT in practicing with appropriately. Therefore, this research objective was to determine the MT structural relationships on athlete success and analyze norm scores of Thai contact sport athletes' MT. This study can be also revealed the order and the significance of the factors within the structural relations, which also can be obtained to clarify what factor in MT have less or more influencing on successive in sport of Thai contact sport athletes. Consequently, the authors ponder of conducting the study to be notion for sport coaches, and sport associations to sustain the mental toughness of their athletes appropriately according to the current circumstance and content of contact sport Thai athletes.

Research methodology

Samples

The samples of the study were obtained by simple random sampling from the populations attending the following sport events (1) 26th Thailand National Youth Games in Phetchabun March 19th - 30th, 2010 (2) Thailand Swimming Championship, 2010 in Pathumthani , 2nd -6th April, 2010



(3) Thailand Dance Championship, Bangkok, 10th -11st April, 2010 (4) King's Cup Thailand Boat Race 1st preliminary round, 20th -22nd May 2010 in Payao and (5) The Thailand's sport clubs athletes and Thailand's team youth athletes who attended the preparation of practicing for 16th ASIAN Games. The specification of the sample size was conducted under the regulation of the test on the structural relation and the invariant of the MT. As a consequence, the minimum of the sample size was 20 times of the number of the items of the question within the inventory (Tabachnick & Fidell, 1996). Accordingly, at least 720 samples were required in the study. (20 X 36 items of the question). Nonetheless, for the well representative sample size of the populations, the study was conducted on more than the appropriate mentioned numbers. In this manner, there were totally of 2,030 samples. They were screened and cut out the missing responded (10), then the completion questionnaire samples were only youth (1,311) and citizen (705) from both contact sports (917) and noncontact (1,113) athletes. The percentage of the noncontact sport athletes was 54.8%. This is slightly higher than the percentage of the contact sport athletes which was 45.2%. The study merely screened the information from the 917 contact sports athletes for the analysis of structural relations of MT and the influences of the athletes' success. The information was only computed for the standard criteria of the Thai contact sport athletes' MT.

Research instrument

MTI (Middleton, 2005a), which passed the translation process and has been developed and proved as good in content and construction validities and reliabilities for its Thai version by Thanida Julavanichpong, Naruepon Vongjaturapat, and Wichai Julavanichpong (2010). The feature of the inventory was self-report scoring in 8 ranking rating scale. (from 1 = It is not true for me to 8= It is true for me). The inventory included 12 components representing the MT. Each component included 3 minor items. There was totally 36 items in the questionnaire. The questions contain the following components: Self – Efficacy (item of 4, 16, and 28), Positive Comparisons (item of 8, 20, and 32), Task Value (item of 9, 21, and 33), Potential (item of 6, 18, and 30), Task Familiarity (item of 10, 22, and 34), Personal Bests (item of 2, 14, and 26), Stress Minimisation (item of 3, 15, and 17), Mental Self – Concept (item of 12, 24, and 36), Positivity (item of 11, 23, and 35), Perseverance (item of 7, 19, and 31), Task Focus (item of 5, 17, and 29), and Goal Commitment (item of 1, 13, and 25). There is Cronbach Alpha Coefficient value of the questionnaire at .95.

Athlete Success Inventory (ASI) (Choosakul and Julavanichpong, 2014), the feature of the ASI is self report scoring in 5 ranking rating scale. (from 1 = It is absolutely not what I think - 5 = It is absolutely what I think). The inventory includes 14 items divided into 3 minor components which are



1) love, commitment and being proud of the sport one plays for item 12, 13, 4, and 11 2) Reward and prestige for item 2, 3, 1, 8, 14, and 3) self controlling for plenary competency for items 7, 6, 9, 10, and 5. The athlete success inventory has been developed by In-Dept interview to describe the features of athlete success of 8 athletes of Thailand team (4 males and 4 females), 2 Thailand team coaches and 4 doctoral degree sport psychologists experienced as Thailand sport team psychologists. The development was conducted to analyze and group the list of athlete success for the content validity of the questionnaire. In addition, the athlete success inventory has been tested for its structural validity by exploratory factor analysis: EFA. The results of the analysis reveals that the 3 components of the athlete success inventory has structural validity by the Eigen value and variant at 2.83 and 20.22 (component 1=2.63) and at 18.75 for component 2 and 2.63 and 18.75 for component 3. The reliability was analyze Cronbrach alpha coefficient. The reliability was at .78 .76 และ .79 for component 1, 2, and 3 respectively, .88 for the overall part. The results of the analysis reveal the structural validity and reliability of the athlete success inventory including the minor components and the whole part at the good level.

Data collection

The samples were sampled from the population to be studied. The questionnaires

were contributed to the samples of the study via the president, the committee of the sport event, or the head of the departments related to the sport event, and the cooperation with the athlete coaches or the sport team manager. Then the data were collected when the athletes had their free time or were free from their main activities.

The answering to the questionnaire started by giving the explanation to the samples about the purposes of the study including the participation in the study by their own will before answering the questionnaires. The samples must be pleased and agree to answer the questions by their own will. The samples must also sign their names on the questionnaire before starting to answer the questionnaire. The answering of the questionnaire take about 10 minutes. The authors or the research assistants (who were trained by the authors) collected the data with the sample, and checked the completion of the questionnaires. If the questionnaires were found incomplete, the samples were asked to confirm their answers. When the questionnaires found complete, the samples were thanked for the corporation and were given pens as the souvenirs for the participation in this study project.

Ethical Considerations

This study was approved and granted by the Department of Development and Research of Sport Science Committee, Sport Authority of Thailand (2010).



Data analysis

The primary information such as age, gender, and the types of sport (team or individual), and the level of ability which divided into being a current national athlete or not a current national athlete were analyze by standard statistics including mean, standard deviation, and percentage. The test for the appropriate size of the whole data and the correlations among the question items whether they were enough for the structural analysis was conducted by testing Kaiser-Meyer-Olkin (KMO) value.

The relation testing between MT and the contact athlete success was analyzed by the Structural Equation Modeling (SEM) in considering data appropriateness statistics which are Fit Indics which contains X^2 , CFI, TLI, RMSEA, path coefficient, df , df_{diff} , and X^2_{diff} . The last testing for MT Norms of the contact sport athletes was computed by standard statistics including frequency, range, mean, standard deviation, score and the percentile (at 25, 50, and 75). The 12 components were analyzed for their norm (the whole group and separated construct group) by computing for its percentile and T-score.

Results

The analysis results of the general information from the Thai athlete samples, the 2,030 samples in the whole study project were varied and presented the previously evidence (Choosakul and Julavanichpong,

2014). Those resulted already supported the potentially scientific evidences for MTI and ASI measures, in term of construct and predictive validity of MT. Part of them, in order to get the this specifying research objectives, the information was screened merely from the 917 contact sport athletes only were available to the structural relation analysis of MT and athlete success, as well as the analysis for the norm scores. The results were presented by this following.

The ASI is a novel inventory developed for the current study. It was also signified as dependent variable to be the effect of the athlete MT variable. The results of the structural EFA (Choosakul and Julavanichpong, 2014), identifies that the athlete success contains three components. Therefore the analysis for the validity according to these criteria will construct three component variables from the results of the analysis in the second part from the questions within the component. The three component variables will be the latent variables of the athlete success in the testing model. The athlete MT variables in addition will be constructed from the results of the CFA in our previously study (Choosakul and Julavanichpong, 2014) and the construction of the variables will be conducted according to the dependent variable from the question within the 12 dimensions as well.

They will be used as the observed variables of MT. In the model, MT variables are the cause to the Thai contact sport



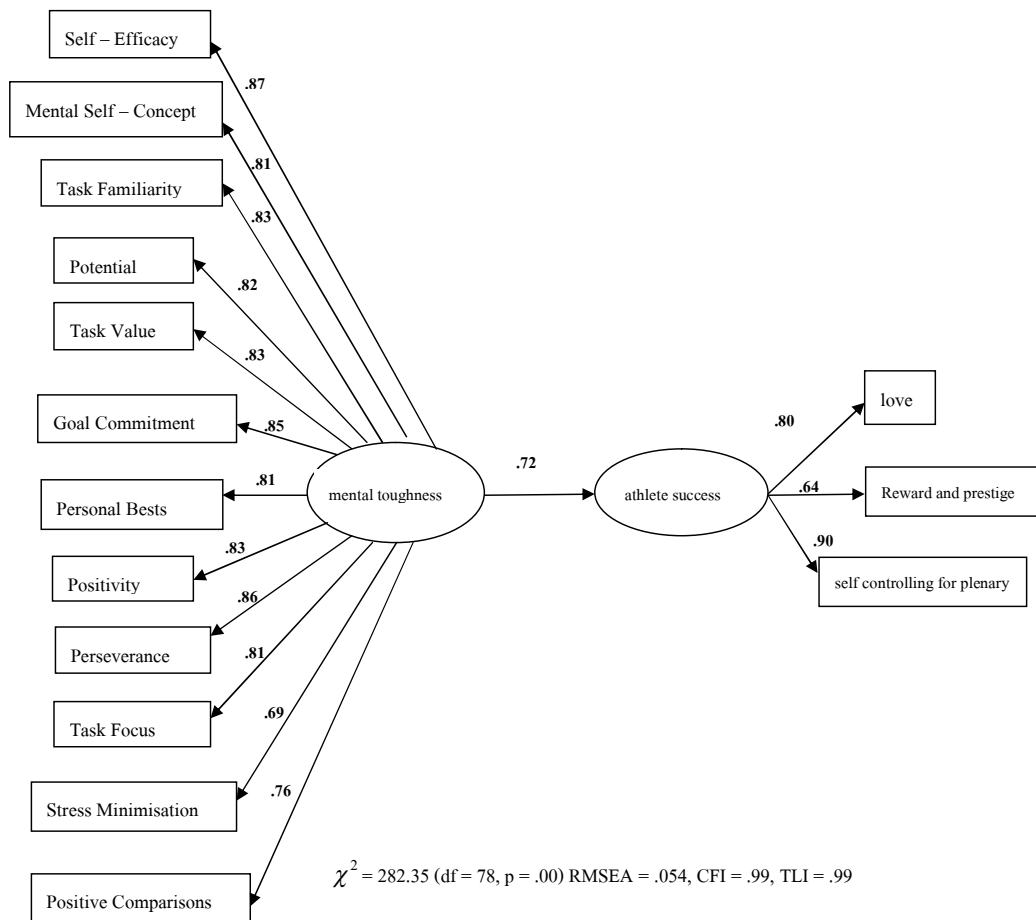
athletes' success. The constructed testing model is the model used to test for the criterion validity. The ASI is the criterion uses to measure the validity of the MTI. If the inventory has validity to measure the athlete MT according to the theory, the contact sport athletes having higher MT tend to have higher success than the athlete with lower MT.

The results of the hypothesis testing model revealed that the model was not concordance with the empirical data. The goodness of fit index value of the model is as follows: $\chi^2 = 689.24$ ($df = 89$, $p = .00$) $RMSEA = .091$, $CFI = .98$, $TLI = .98$. Therefore, the authors adjusted the hypothesis testing model by allowing the deviation of some observed variables relate to each other according to the nature of the variables with the same measuring method. The results of the analysis illustrated in picture Number 1, which revealed that the adjusted model had a good fit with the data. The good of fit index values of the model is as follows: $\chi^2 = 282.35$ ($df = 78$, $p = .00$) $RMSEA = .054$, $CFI = .99$, $TLI = .99$, and the standard influence coefficient which the MT had to predict the athlete success = .72. The results of the analysis confirm the criterion validity of the MT inventory which leads to the contact sport athletes' success.

The purpose of the study is to obtain the standard criteria to measure the level of

the contact sport athlete MT. The findings in the study result in the standard criteria to measure the total score obtained from the completion of the MTI. These standard criteria can measure the MT by measuring each component and the overall dimension. However, the most specific measuring ought to consider each component of the contact sport athletes. This could be conducted by comparing the norm of the raw scores to be percentile rank or T standardized scores. The appropriateness of the comparing with the norm will relate to the use of measuring results for referencing or considering for specific purposes. The norm comparing with T standardized scores ought to be more appropriate when it was used to measure the level of each athlete's mental toughness and in each component. While the comparing with the norm from percentile are more appropriate for the comparing with the level of the contact sport athletes' mental toughness.

Furthermore, the last testing of this research was analyzed the all items score from each 12 constructs of MT by the basic statistics describing in order to evaluate the level of MT. This contact sport MT norm results showed the Percentile Rank and T-score. These norm, there can be evaluated in each factor and global of MT for Thai contact sport athlete.



Noted: all of the coefficient value has statistical significance at .05

Picture 1 The standard influence coefficient of the MT model and the contact sport athletes' success

5. Norm of Thai contact sport athlete mental toughness

Discussion

The results of the study report and confirm the current validity of the MTI. The first MTI has been tested and confirmed in finding such validity value (Choosakul and

Julavanichpong, 2014). The study used the athlete success as the criterion variable to compare and test the relation with the MT, in view of that it is consistent with the previously stated and suggested research literatures, the literatures suggest that the athletes' success resulting from the mental components (Loehr, 1986). Especially, the



development to the championship of the athlete themselves (Norris, 1999). This includes the coaches' perceptions that the mental toughness is significantly important to the athlete success. (Gould, Hodge, Peterson, & Petlichkoff (1987). As a result, the authors have chosen the athlete success as the variable to test the current validity of the MTI for the contact sport athlete as well. The significance of the current validity of the MTI explains that according to the theoretical principle the athletes with higher mental toughness tend to have higher athlete success. Thus in the practical way, in order to promote the success of the athlete, the factors to the success which are the MT components should be considered. The findings of the study show that the influence coefficient which the mental toughness variable has with the contact sport athlete success is at.72. Significantly, the mental toughness variable can generate the contact athletes' success as a percentile of 72 % .

According to the perception of Middleton et al., (2004 a), there is a study suggesting the notion from the qualitative study collecting data by the interview with Olympic Games athletes and coaches. The past study suggests the approach to develop the mental toughness model factors. In the model, the minor components were divided into orientation and strategy for the study within Thai athlete samples (Julavanichpong et al, 2010). The model was tested for its

structural validity by the first order CFA. The results of the analysis revealed the MT model has a good of fit with the empirical data from the samples which were youth students. Choosakul and Julavanichpong (2014), their first step of the findings of the study was to test for the structural validity by second order structural confirmative analysis according to Middleton et al., (2004 a). Additional, their second analysis was contrast to the analysis which report the testing results of the first order confirmative analysis conducted by Julavanichpong et al (2010). The analysis was conducted in order to obtain the data explaining about the most correct and appropriate components of the MT for the athletes. About the results of those analysis, the correlation of the latent factors are the two dimensions of the mental toughness including MT orientation and strategy. MT includes six components which self – efficacy, mental self –concept, potential, task specific attention, task familiarity, personal bests, and task value. The dimension of MT strategy includes perseverance, goal commitment, positivity, composure under stress, and positive comparisons. The results of the analysis suggest that the two dimensions have very high level of relation to each other. The high level of relation of the two dimensions suggests the possibility of each dimension and also reflects to the general factors. Meaningfully, the consideration of the explanation of the overall mental toughness should consider each minor component of the MT. The



consideration about the two dimensions is fairly complicated since the two factors are very similar. Nevertheless, in the practical way, the consideration may be unproblematic if the two main factors: environmental content and strategic factors are considered then investigated in their details.

Conversely, in order to obtain theoretical benefits and validity, the author, Choosakul and Julavanichpong (2014) chose to follow the same notion which is to use the first order structural confirmative analysis to find the fit indices, and standardized factor loadings in every component. All components in the table have the statistical significance at .05. The results of the study are corroborate with the previous studies both in Thai and foreign content (Julavanichpong et al, 2010; Middleton et al., 2004 a; Loehr, 1986). The affirmative results of the previous studies suggest that the Thai athlete mental toughness inventory is able to measure the overall mental toughness components with interdisciplinary. In addition, the good of fit of the testing model reflects the validity of each question item in measuring certain dimension to which the question is constructed for. These findings also represent the ability to operate the inventory to the other samples within the same populations which mean both contact sport male and female Thai athletes in youth level and citizen level which will more focus and continue discuss in the next following paragraph.

Structural relationship of the MT on athletes success in contact sport

This current study was tested the structural relation between the MT and the athlete success by signifying the athlete success as the criterion variable and the MT as the predictive variable. The model used in the testing is the model to test for criterion validity because the athlete success is the criterion used to measure the validity of the MTI. If the inventory is able to measure the athlete MT as the supposing theory, the athlete with higher mental toughness tends to have higher success than the athlete with lower MT.

The results of the following adjusted testing model revealed that the testing model has a good of fit with the data. $\chi^2 = 282.35$ ($df = 78$, $p = .00$) $RMSEA = .054$, $CFI = .99$, $TLI = .99$ The standard influencing coefficient value with the mental toughness variable has to the athlete success is at 72. This value confirms the criterion validity of the mental toughness inventory which leads to the contact sport athlete success which high up to 72 %. In statistical term, this percentage is relatively high in prediction. The results of the study ought to be one of the information suggesting that in the contact sport athletes, the relation between MT and the contact sport athlete success can be explained and developed the success to the athletes. It is significant to consider the factors of MT. By considering from the results of the study, it is found that the MT factor leading to the



athlete success mostly has the comparable value of predictive value (as illustrated in figure 1). The standard coefficient value is between .69 (stress reducing management) to .87 (certain self confidence). By this point the most strong source of MT is self confidence, in practically, if we need to achieve more sport success, the enhancing of self confidence for the contact sport athletes could be considered as the first priority (Choosakul and Julavanichpong, 2014; Panuthai and Teinthong, 2012). Even, the stress reducing management factor was found to be lowest in predicting MT for contact sport athlete, but there was still significance which according to many evidence that show the cognitive anxiety are related to the athlete performance (Sukdee, 1990; Petchsurasi, 1999; Chaumpong, 2002; Juntabut, 2004; Monica, et al. n.d.; Sonstrom & Bernado, 1982; Passer, 1983). Therefore, all 12 factors in MT could be needed to serve the contact sport athlete for enhancing their successive training program.

Moreover, if we need the athlete achieve more success, the choosing to find the way to manage and develop the athlete should consider the other later priority of the relate factors according to their level of predictive value to develop the MT and the success of the contact sport athletes. As the matter of fact that each of the MT factors has the feature of the individual understanding and the cognitive approach, the acknowledgement to choose the

appropriate activities, environment, or experiences for individual athlete is complicated. Consequently, if we are able to measure and understand each minor component of the athlete MT, the coaches or the athletes are possibly able to find the notion to develop each factor important to the athlete. And it can be done by consulting and finding the way to plan for management and development for the athlete mental toughness together with the sport psychologists. The results of the testing doubtless allow the fruitfulness of the explanation and the suggestion about MT management. As indicated in the previous studies, the management for assessment and consulting about athlete MT should be concerned as a challenging and more clearly practical issue for the study in this field.

Contact athlete MT norm scores

The finding of the study conducted by Pattanamontree (2009) purposes to construct a regular criterion for measuring Thai team and Thai athletes MT, however, the study can measure separately, according to genders and abilities of the athletes. This regular criterion is different from the criterion used in the current study. The inventory used in the previous study is of Loehr (1986) which contain only 7 minor components while the inventory used in the current study is constructed base on the theory of Middleton et al. (2005 a) which is the latest developed version of MTI. The inventory includes more components and has been



tested and confirmed for its structural validity. The inventory has more comprehensibility of the MT components. The current regular criterion development is developed by dividing the MT criterion into overall criterion and the regular criterion for the minor components of contact sport. However, the most appropriate and the most specific measuring should compare to the regular criterion of each component of contact sport athletes. The comparison can be done by comparing the total raw scores and regular criterion into percentile rank or T standardized scores. In spite of this, the appropriateness of the regular criterion score comparison will relate to the reference of the results or to considering the appropriateness of the results. T standard scores are more appropriate than the measuring the athlete MT by individual athlete and each component. While the comparison of the regular criterion scores from the percentile rank is more appropriate to compare the level of the athlete MT of the entire contact sport athletes.

In conclusion, the findings in the study generate the inventory which contains reliability, structural validity and content validity to predict the contact sport athlete success. The inventory also has the ability to measure the contact sport athlete success and the mental toughness appropriately with specific kind of contact sport. These findings are advantageous for the further development for Thai athlete mental toughness.

Suggestions and Recommendations

The suggestion for the implementation

The MTI should be implemented to Thai athlete, especially the measuring explain the minor components of each mental toughness component. This is useful to find the notion to develop and support the athlete MT. For instance, coaches may implement the inventory as a principle for the athlete MT practice. Sport psychologists can use the inventory as the notion to understand the athletes or to give them advices. Therefore, the MTI contains a great deal details and consists of several components. Each component has merely high relation to each other, thus the implementation of the inventory, the implementer is supposed to well understand and concentrate to consider the question items carefully.

The recommendation for further study

Provided that the inventory depends on paper base answering, there are some limitations in the implementation for instance when the athletes have to go to compete in another province or going aboard. Consequently, the further study possibly implements the inventory and regular criterion of the current study via online data base which the athletes can complete the questions at all time. Via the online data base, the authors or the coaches are also able



to access the recorded information of their athletes. Therefore, the study was conducted with the samples who were Thai team athletes and Thai athletes, however, the current study did not analyze the stabilities between the abilities of the athlete of both groups. At the matter of fact that the

abilities of the athletes may perhaps effect to the mental toughness model, thus the further study should be conducted to test the stabilities of the abilities of the Thai team athletes and the general athletes and also the development of the regular criterion for the specific group athletes.

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