



## Exploring the Impact of Mental Toughness on Weight-Loss Process among Tug-of-War Athletes

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### ABSTRACT

Tug-of-war has become a competitive international sport that heavily emphasizes the distribution of a team's body weight. In order to make the most of body weight, athletes have to rapidly drop their weight for the weigh-in to be qualified for the class category's bare minimum requirement, and to regain the lost weight after passing the barrier. This process of weight loss involves the athletes being mentally prepared for high-intense training, hunger endurance, injuries, well-being, and risk of irreversible damage. Training programs include high-altitude mountaineering and survival tactic to endure the harsh environment, pushing one's mentality to its limit. Such training of the mind in sports is regarded as mental toughness where the athletes with a high level of determination to stay motivated in order to achieve their goals disregard the challenges and setbacks. Previous studies have shed light on the relationship between athletes' mental toughness in competitive sports performance, however, there is no direct appliance of such a relationship in tug-of-war athletes. In addition, since tug-of-war research studies are limited in existing literature, this study aims to explore and verify the impact of mental toughness applies on tug-of-war athletes as well on their weight-loss process. To achieve this objective, the researchers investigate 138 tug-of-war athletes aged 16 years and above, using the sports and psychological toughness scale measurement tool to evaluate their mental toughness during the weight-loss process. The findings of this study help contribute to a better understanding of mental toughness training for competitive athletes that are undergoing weight-loss and the coaches to make use of the findings in their training programs.

Keywords: Tug-of-War, Mental Toughness, Weight-Loss, Competitive Sports

### Background

Tug-of-war activities are regularly held in schools worldwide at all grade levels. A traditional tug-of-war would involve 20 to 30 participants without weight restrictions, but the more recent rule of eight-person tug-of-war is becoming an international standard, as a result, weight became more of an advantage than technical expertise. Teams of eight must meet their weight requirements to be qualified for the competition, making technique and strategy crucial to improve the fairness of the competition. From a sports perspective, the eight-person tug-of-war has several characteristics: weight classification, rules, fast-paced matched, age, gender, venue, etc. By part taking the lightweight category, Taiwanese athletes have the advantage to compete against other Eastern opponents that have the same physique conditions (Tu, 1997; Lin et al., 2016).

In tug-of-war culture, to gain the most advantage out of the weight classification, coaches and athletes have to use rapid weight loss and rapid weight gain to increase their advantages. Since the total weight of the eight athletes cannot exceed the weight limit in the class, which also meant the result of weight loss an individual can affect the entire team's best lineup and power distribution. The entire weight loss process takes a toll with the physical and mental tests, for instance: high-intensity training despite hunger, injury, and long-term high-risk situations. In addition, athletes have to endure high-risk extreme environmental challenges during the weight-loss process, high-altitude mountaineering, ultra-marathon, and limited exercise. These extreme challenges also separate the strong from the weak, when overcome this challenge would allow athletes to develop an advantageous psychological mindset which accounts for more than 50% of the key to victory (Weinberg & Gould, 2002). After the team has endured the physical pain together, such mental toughness brings confidence and goal-setting for their future. (Delle et al., 2003; Pettersson et al., 2013; Crust, 2016; Jaeschke et al., 2016).

Among the mental skills for successful performance, mental toughness is regarded as the most important psychological characteristic (Gould et al., 1987). Defined as the athlete's spirit of actively seeking progress and unremitting efforts in the hard training situation, as well as the attitude of desperately pursuing victory and honor during the competition (Crust & Swann, 2013; Gucciardi et al., 2015). No matter what kind of competitive sports, practice, competition, and mental toughness are the key factors affecting success (Bull et al., 2005; Crust, 2007; Jones et al., 2002, 2007) see mental toughness as a key factor in successful performance. Cowden (2017) surveyed about 88% of the research on mental toughness and found that athletes with higher levels of mental toughness tend to gain more advantage or perform better. In recent years, many related studies have found that athletes' mental toughness

has a significant impact on sports performance and sports achievements, especially in elite athletes and elite athletes (Crust, 2007; Gucciardi, 2008; Jones et al., 2002, 2007; Thelwell, 2005).

Mental toughness can be divided into general situations and extreme environments. The concepts and definitions of the two are roughly similar. The difference is that the psychological toughness in extreme environments is overcoming obstacles in pursuing goals. The characteristics are much different from general situations. Ensure safety and survival, knowing yourself, and coping with success and failure (Jones et al., 2002, 2007). However, tug-of-war has the characteristics of both competitive sports and extreme environments. To explore the psychological toughness required for tug-of-war, it is necessary to integrate the concepts and definitions of both general situations and extreme environments.

Many studies have explored that mental toughness is related to competition performance (Connaughton et al., 2008; Nicholls et al., 2008; Gucciardi et al., 2015), but they cannot be fully applied to tug-of-war, because tug-of-war is a group competitive sport, and the process of weight loss seems to be related to personal ability in an extreme environment, which is different from past research on competitive sports. There are differences in risky activities related to others and in extreme environments. To explore the impact of mental toughness on successful weight loss in tug-of-war athletes during weight loss, and to understand which characteristics of mental toughness are the key factors affecting weight loss in tug-of-war. The aim was to explore which characteristics of mental toughness are the key factors affecting the weight loss process of tug-of-war athletes. The research question was to understand which mental toughness characteristics predict successful weight loss in individual tug-of-war athletes.

## Research Methods

Weight loss is common in sports where there are weight classes. Before the weigh-in, athletes trim down to compete in a lighter-weight division. These tactics frequently involve stringent diets, extensive exercise regimens, and on occasion even drastic dehydration techniques. Careful preparation is required to lose weight, as is the cooperation of sports consultants, coaches, and other experts. During this stage, athletes must maintain unwavering discipline, commitment, and mental toughness because they must overcome both physical and mental challenges. To investigate the mental toughness of tug-of-war athletes, the researchers approached 150 athletes and their coaches for consent to those who have participated in tug-of-war competitions ages over 16 years old and were surveyed for their experience in weight loss and mentality. Of the 150 received forms, 138 were feasible, 84 male and 54 female athletes. The average age is 19.8 years old with training from two to twenty-six years old. The sports and psychological toughness scale measurement tool, with a 5-point Likert scale (1=strongly agree, 5=strongly disagree), was adopted among the works of Huang (2003), Crust (2011), and Gucciardi et al. (2015) for the questionnaire design. Cronbach's  $\alpha$  coefficient was used to test the scale's internal consistency. The reliability test indicates a 0.75-0.91 result. The athletes were asked about their targeted weight goals before the weigh-in, and to rate their level of mental toughness during the weight loss process on the assessment. Demographic questions aside, ten items were created to measure the overall mental toughness of the participants. The main questionnaire items are as follow in Table 1.0

**Table 1.0** The Mental Toughness Evaluation Form.

#	<b>Mental Toughness Evaluation Form</b> Please indicate how much you agree with the following statement.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	I will do my best to achieve my weight loss goals.					
2	Regardless of the success or failure of weight loss, I will do my best.					
3	During weight loss, I will constantly strive to surpass my set weight loss goals.					
4	During weight loss, I will always strive to pursue my set goals.					
5	During weight loss, no matter what, I will strive to achieve my goals.					
6	During weight loss, I will make an effort to try good methods.					
7	During weight loss, I will do my best to meet the coach's requirements.					
8	During weight loss, no matter what, I will fully achieve it.					
9	Although there is pressure, I usually have control over everything.					
10	Although weight loss is tough, I will still demand a lot from myself.					

## Results and Discussion

The 10 items surveyed measure various aspects of mental toughness in the context of weight loss, including an individual's mindset, determination, and ability to overcome challenges which are all the sub-components to define mental toughness. Tables 2.0 and 3.0 summarized the main findings of this research study on Tug-of-war athletes' mental toughness during their weight-loss journey.

**Table 2.0** Mental Toughness among Male and Female Athletes (N=138)

		Male	Female	F-value
<b>Factors</b>		N=84	N=54	
<b>Mental Toughness</b>	<i>M</i>	4.44	4.44	2.585

\* $p < 0.5$

Table 3.0. Description Statistics of Mental Toughness of Tug-of-War Athletes (N=138).

	Mean	Standard Deviation	Skewness	Kurtosis
<b>Mental Toughness</b>	4.44	0.45	-0.75	-0.17

The mental toughness mean score indicates a relatively high level of 4.44 among the athletes. The standard deviation of 0.45 suggests an even consistent dispersion of data points around the mean. The skewness value of -0.75 shows an acceptable slightly negative skew for its symmetry to the distribution of the mental toughness score. The kurtosis value of -0.17 suggests a normal flat distribution. The analysis also examined the differences in mental toughness between male and female athletes. The mean scores for mental toughness were the same for both male and female athletes, with both groups having an average score of 4.44. The F-value of 2.585 suggests that there is no significant difference in mental toughness between males and females in this sample.

These findings indicate that tug-of-war athletes, regardless of gender, exhibit a high level of mental toughness during the weight loss process. The results reflected on existing literature and suggest that mental toughness may significantly contribute to successful weight loss even in tug-of-war sports which is not popular enough in the existing literature. However, further analysis and interpretation are necessary to determine the specific characteristics of mental toughness that play a key role in the weight loss process within this sport. The ability to effectively manage pressure and stress is an important aspect of mental toughness in sports not just in tug-of-war. Athletes with high mental toughness are better equipped to handle the intense demands and competitive nature of the sport, as Gucciardi et al. (2015) found. Athletes with mental toughness are more resilient to setbacks and keep their attention on their goals. Athletes can increase their mental toughness by developing effective stress management strategies and coping mechanisms. This can have a positive impact on their performance and overall well-being (Crust, 2007; Connaughton et al., 2008). Confidence and determination to overcome obstacles and stay motivated even with setbacks test the athletes' perseverance (Nicholls et al., 2016), thus when overcome with the weight loss process, the result of physical performance will be obvious.

Moreover, mental toughness is closely related to an athlete's ability to maintain a positive mindset and exhibit emotional control. Just as Connaughton et al. (2008) discussed the importance of emotional regulation in mental toughness, the findings of this study support the notion that athletes with higher levels of mental toughness are more adept at regulating their emotions, staying focused, and avoiding negative distractions (Gucciardi et al., 2017). This psychological resilience allows athletes to remain calm and composed, even in high-pressure situations, enabling them to make better decisions and perform at their best (Gucciardi et al., 2015; Crust, 2011). By cultivating a positive mindset and developing emotional control strategies, athletes can enhance their mental toughness and effectively navigate the challenges associated with weight loss, leading to improved overall well-being and performance (Jones et al., 2002; Nicholls et al., 2016).

## Conclusion

In the past, mental toughness was mostly discussed in practice and competition situations, and many events are part of the competition, which cannot be ignored in the tug-of-war athlete's career. Thus the findings of this study exhibit the high level of mental toughness of tug-of-war athletes during their experience of weight loss. Gender does not show any difference in this matter, verifying that the psychological trait in achieving the outcome does not rely on the individual's gender. The results further align with existing literature by providing insights into how each competitive sports athlete would require some form of high mentality strength and resilience during the preparation process that requires weight loss. The importance of mental toughness is said to be developed from effectively managing stress and setbacks through training. This paper marks an acknowledgment that tug-of-war, like athletes in other competitive sports, need to cultivate mental toughness to excel in their respective disciplines. Future research would further measure how these athletes would maintain a positive mindset, resilience to pain, and emotional control by measuring their performance and observation methods. Further, the need of focusing on comparing the long-term effects of athletes' overall well-being and the techniques they used to cope with such hardship. As tug-of-war is a team sport, the bonding between team members could also be a strong indicator for the athletes to develop stronger mental toughness in their training.

With these findings, new athletes can better prepare themselves to equip the mindset in building resilience by embracing challenges and maintaining a positive mindset even after experiencing setbacks. The development of mental toughness is crucial to any athlete's career and success. During the process of data collection, the coaches are aware of incorporating mental training exercises, goal setting, and stress management strategies into their training program. Coaches could further foster a supportive environment or a team culture to encourage constructive feedback and communication, so coaches can spot struggling athletes early on. Collaborating with sports psychologists is also recommended as they are able to recognize patterns and provide specialized support to the team in overcoming psychological barriers that may hinder their performance.

The results align with previous research emphasizing the significance of mental toughness in sports and suggest that it plays a crucial role in the weight loss journey of athletes in the context of tug-of-war. The study's findings contribute to the existing literature by providing insights into the mental toughness characteristics specific to the weight loss process in tug-of-war sports. The ability to effectively manage pressure, stress, and setbacks emerged as key factor associated with mental toughness in this context. Additionally, maintaining a positive mindset, emotional control, and perseverance were identified as important components of mental toughness that support athletes' performance and overall well-being. However, it is important to acknowledge certain limitations of the study. Firstly, the research was conducted within a specific sample of tug-of-war athletes, limiting the

generalizability of the findings to other populations or sports. Secondly, the study relied on self-reported measures of mental toughness, which may introduce response biases or subjectivity. Future research could overcome these limitations by including a more diverse range of athletes and employing objective measures of mental toughness, such as performance-based assessments or observational methods. Future research in this area should focus on further exploring the relationship between mental toughness and weight loss outcomes, including physical health indicators, psychological well-being, and adherence to weight loss interventions. Longitudinal studies could provide insights into the long-term effects of mental toughness on weight maintenance and overall health. Additionally, developing intervention strategies aimed at enhancing mental toughness in athletes undergoing weight loss could be beneficial. Such interventions could incorporate techniques for stress management, emotional regulation, and goal setting to improve athletes' mental toughness and their ability to navigate the challenges of weight loss. By addressing these recommendations, future research can expand our understanding of mental toughness in the weight loss process, explore its impact on various outcomes, and develop practical interventions to support athletes in achieving successful weight loss and overall well-being. The preliminary research findings and future research directions of tug-of-war competitors facing significant events before the competition are presented in this study. Future research is anticipated to concentrate on the discussion of psychological toughness in relation to significant occasions other than practice and competition, giving coaches and tug-of-war athletes more clarity in practice.

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