An Examination of Mental Toughness over the Course of a Competitive Season

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Mental toughness is critical for achieving athletic success (Loehr, 1994) and appears to be developed through experience (Jones, Hanton, & Connaughton, 2007). The purpose of this study was to examine whether the mental toughness abilities of high school wrestlers change over a competitive season and to empirically examine potential relationships with age, experience, and success. High school male wrestlers (N = 54) completed the Mental, Emotional, and Bodily Toughness Inventory (MeBTough) at the beginning and end of a competitive wrestling season. The MeBTough is a self-report measure of mental toughness with some initial validity evidence but additional validity support is needed (Mack & Ragan, 2008). A paired-sample t-test found no significant difference between pre-test and post-test MeBTough scores. Pearson correlation results indicated that mental toughness was positively related to age and season winning percentage, but not wrestling experience or practice time. Significant differences in mental toughness abilities were found between freshmen and seniors as well as between wrestlers with winning and losing records. Based on the results, mental toughness appears to be a psychological skill that is positively associated with competitive success and takes years to develop. Thus, coaches should try to maximize the number of opportunities and experiences available for the development of mental toughness throughout an athlete’s participation in sport. Additional research examining mental toughness and the validity of the MeBTough inventory is warranted.
One of the most important assets an athlete can have is mental toughness (Goldberg, 1998; Thelwell, Weston, & Greenless, 2005). This psychological skill is critical for achieving athletic success (Gould, Dieffenbach, & Moffatt, 2002; Loehr, 1994) and may play a significant role in rehabilitation compliance and recovery (Levy, Polman, Clough, Marchant, & Earle, 2006). Since mental toughness is a relatively new research topic within the sport psychology field, most of the early research has focused on identifying attributes of a mentally tough athlete and developing a definition of mental toughness (i.e., Bull, Shambrook, James, & Brooks, 2005; Jones, Hanton, & Connaughton, 2002, 2007; Loehr, 1986, 1994). Based on this research, mental toughness has been defined as the ability to cope with the demands of competition and training better than one’s opponent (Jones et al., 2002, 2007).

The examination and identification of mental toughness attributes in elite athletes has led to the suggestion that mental toughness is developed through experience and environmental influences. For instance, a study of professional soccer players concluded that mental toughness was formed through the experiences of varying environments they had encountered during their formative stages of development (Thelwell et al., 2005). Elite female gymnasts identified a variety of competitive and non-competitive experiences, key personnel, and environmental influences that were crucial to the development of their mental toughness (Thelwell, Such, Weston, Such, & Greenless, 2010). Gucciardi, Gordon, and Dimmock (2009) found that Australian football players who were older, had more years of experience, and were considered elite or sub-elite athletes had higher scores of mental toughness than those who were younger and had less playing experience. Bull et al. (2005) noted that elite cricketers identified various environmental influences that they believed contributed to the development of mental toughness throughout the various stages of their careers and thus suggested that younger players be provided an environment that provided maximum opportunities to develop their attitudes, character, and thinking.

Jones’ et al. (2007) interviews of some of the world’s top athletes, coaches, and sport psychologists reached similar conclusions. When these elite athletes encountered a stressful or difficult obstacle, instead of backing down and failing, they became tough inside and overcame the adversity, thus developing their mental toughness. Connaughton, Wadey, Hanton, and Jones (2008) further examined these same participants and reported that the early, middle, and later years were commonly mentioned phases. Results indicated that mental toughness was developed during each phase of life, with mental toughness being fully developed in the later years of life due in part by an increased competitive experience. Thus, based on the existing qualitative research, mental toughness appears to be developed over time through experience (Bull et al., 2005; Connaughton et al., 2008; Gucciardi et al.,
2009; Jones et al., 2007; Thelwell et al., 2005). However, none of this research has attempted to quantitatively examine potential changes in mental toughness over time and none has focused on the sport of wrestling.

Mental toughness is thought to be particularly pertinent for high-energy demanding combative sports like wrestling because exhausting physical efforts are required to maximize performance (Gould, Hodge, Peterson, & Petlichkoff, 1987). Furthermore, collegiate wrestling coaches have identified mental toughness as a critical attribute for successful wrestlers regardless of the level of competition (Gould et al., 1987). This commonly held belief is reflected in the strong emphasis that wrestling enthusiasts place on the development of mental toughness. For example, out-of-season wrestlers can attend 28-day intensive camps where athletes are restricted from family and social contact while working out a minimum of four times a day, all designed to increase one's mental toughness. During the season, wrestling coaches are constantly trying to incorporate drills and activities designed to increase mental toughness (Gable, 1999). Therefore, wrestling was deemed an ideal sport for examining potential changes in mental toughness abilities.

The purpose of this study was two-fold. The first purpose was to empirically examine the mental toughness abilities of high school wrestlers and determine whether these abilities changed over the course of a competitive season. Because all of the existing mental toughness research has focused on elite athletes, the second purpose was to examine the relationships between the high school-age wrestlers' mental toughness abilities, age, grade level, wrestling experience, practice time, and wrestling success.

Method

Participants

A total of 63 Iowa high school male wrestlers participated in the initial data collection. Fifty-four of these participants also completed the post-test questionnaire. Thus, 9 participants were dropped from the study resulting in a total of 54 wrestlers. The mean age was 15.98 years (SD = 1.24) with a range from 14 to 18 years of age. The wrestlers were pretty evenly split by grade (i.e., 13 freshmen, 14 sophomores, 15 juniors, & 12 seniors) and all 14-weight classes were represented. Three (5.6%) of the participants indicated that this was their first year of wrestling, 25 (46.3%) said they had 2-5 years of experience, 16 (29.6%) had 6-10 years, and 10 (19.5%) reported having more than 10 years of wrestling experience.

For this group, 42.6% (n = 23) reportedly practiced wrestling for 2-4 months each year, 20.4% (n = 11) practiced 5-6 months, 16.7% (n = 9) 7-10 months, and 20.4% (n = 11) practiced wrestling year round. Of the 54 wrestlers in this study, most (n = 38, 70.4%) had
a winning record for the season (i.e., more individual wins than losses). Seventeen individuals (31.5%) had qualified for the wrestling state tournament with 15 having been a place winner (27.8%) and three state champions (5.6%). When asked about their plans to continue wrestling in college, 21 participants (38.9%) indicated they would be interested in wrestling at the collegiate level, 26 said no (48.1%), and 5 were undecided (9.3%). The most common reason for getting started in wrestling was due to their parents (42.6%), followed by friends (27.8%) and self-interest (22.2%).

**Measures**

*Mental, Emotional, and Bodily Toughness Inventory (MeBTough).* The Mental, Emotional, and Bodily Toughness Inventory (MeBTough) (Mack & Ragan, 2008) is a 43-item, self-report measure of toughness. This one-dimensional scale assesses the physical, mental, and emotional dimensions of toughness based on the writings of Loehr (1994). Examples of questions include “I am willing to put myself totally on the line and risk losing” and “I sometimes allow my negative emotions and feelings to lead me into negative thinking.” Respondents are asked to indicate how often they experience each item on a 4-point Likert-type scale, ranging from 1 (Almost Never) to 4 (Almost Always). Nine of the items are designed to be reverse-scored. Responses to items are summed and can range from 43 to 172 with higher scores indicating more mental toughness ability.

Previous Rasch calibration results have revealed good model-data fit with acceptable infit and outfit statistics, excellent item variability, and high separation variability, indicating good psychometric properties of the MeBTough (Mack & Ragan, 2008). Initial validity evidence was provided by the differences in mental toughness scores found between athletes and nonathletes as well as a positive correlation between mental toughness scores and participants’ rating of their mental toughness on a 20-point Likert-type scale (Mack & Ragan, 2008). The authors also noted that additional support for the validity of the MeBTough is needed (Mack & Ragan, 2008).

**Demographic Questionnaire.** The Demographic Questionnaire was completed by each of the participants. The 13 questions requested responses related to the wrestler’s age, class in school, gender, years of wrestling experience, weight class, win-loss record, and wrestling accomplishments.
Procedures

Participant Recruitment. After receiving approval from the Institutional Review Board, ten area Iowa high schools were recruited to participate in this study. All athletic directors and head wrestling coaches were contacted via email and by phone repeatedly prior to the start of the wrestling season as well as during the first two weeks of the season. Five schools verbally committed to participating in the study but only four schools provided letters of support, which were needed before data collection could begin. One high school discontinued participation, leaving three high schools.

Upon receiving letters of cooperation from the school’s athletic director and the school’s head wrestling coach, participants were recruited from the entire wrestling program’s roster. At the beginning of the season, an informational meeting was set up with each of the wrestling teams to describe the study. The volunteering wrestlers were given paperwork to take home to their parents. This paperwork included a letter describing the research and both parental and minor consent forms. Wrestlers were asked to bring signed consent forms back to school and hand them in to their coaches.

Pre-test. Approximately 7 days after the informational meeting and prior to the first interscholastic competition, a second meeting was held with each team to collect the signed parental and participant consent forms as well as complete the MeBTough and demographic questionnaires. Each participant was given an identification number to ensure confidentiality.

Post-test. A third and final meeting was held with each team at the end of the regular competitive wrestling season and before the season-ending tournament leading to the state tournament. During this meeting participants were asked to again complete the MeBTough Inventory and record their individual season win-loss record.

Data Analyses

Two separate Cronbach alphas were performed to examine the internal consistency of the MeBTough. Acceptable reliability coefficients for Cronbach’s alpha were considered greater than .80 (Baumgartner, 2006; Nunnally & Bernstein, 1994). A paired-sample t-test was calculated to determine if there was a significant difference between the pre-test and post-test scores. Pearson correlations were performed to examine the relationships between the mental toughness post-test scores and age, years participating in wrestling, practice time, and individual season winning percentage. A one-way analysis of variance (ANOVA) was calculated to compare the mental toughness post-test scores of participants by grade level.
Results

The primary purpose of this study was to examine the mental toughness abilities of high school wrestlers and determine whether these abilities changed over the course of a competitive season. Mental toughness was assessed using the MeBTough questionnaire (Mack & Ragan, 2008). The mean mental toughness pre-test score of the wrestlers was 140.31 (SD = 16.62) with a range from 98 to 167. The mean post-test score was 140.41 (SD = 18.77) with a range from 106 to 170. The Cronbach’s alpha coefficients were acceptable for each administration (Pre = .93; Post = .95). A paired-sample t-test found no significant difference from pre-test to post-test (t (53) = -.054, p > .05).

The Pearson correlation examining the relationship between participants’ post-test mental toughness scores and age revealed a positive correlation (r = .322, p < .05) indicating that older participants tended to have higher mental toughness scores. A significant positive correlation (r = .272, p < .05) was also found between post-test scores and season winning percentage. Successful participants tended to have higher mental toughness scores. A follow-up independent samples t-test revealed a significant difference (t (52) = -2.088, p < .05) between the mental toughness post-test scores of individuals having a winning record (m = 143.76, SD = 18.47) and those having a losing record (m = 132.44, SD = 17.52). No significant correlations were found between the post-test scores and wrestling experience or practice time (p > .05).

The post-test means of wrestlers in the four different grade levels were compared using a one-way ANOVA. A significant difference was found among the grade levels (F (3,50) = 2.86, p < .05). Tukey’s HSD was used to determine the nature of the differences and revealed that seniors had higher mental toughness scores than freshmen (see Table 1). No other differences were significant.

Table 1.

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Freshmen (n = 13)</th>
<th>Sophomore (n = 14)</th>
<th>Junior (n = 15)</th>
<th>Senior (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>130.2*</td>
<td>137.4</td>
<td>145.0</td>
<td>149.3*</td>
</tr>
</tbody>
</table>

*Significantly different at p < .05.
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Discussion

This research was designed to examine the mental toughness abilities of athletes participating in high school wrestling programs. Mental toughness was assessed using the MeBTough (Mack & Ragan, 2008), a one-dimensional self-report measure that displayed good internal consistency for each administration. Overall, the MeBTough scores for this group of wrestlers ($M = 140.4, SD = 18.8$) were very similar to those reported in previous research ($M = 140.6, SD = 17.1$; Mack & Ragan, 2008) suggesting that the participants were honest in their responses and that a wide range of mental toughness abilities were represented.

Results addressing the development of mental toughness over time were mixed. First, mental toughness was positively correlated with age and there was a significant difference between the mental toughness abilities of freshmen and seniors. This means that older athletes have developed more emotional, psychological, and mental toughness than younger athletes. These findings support previous research that found older Australian football players had greater mental toughness scores than those who were younger (Gucciardi et al., 2009) and confirms the importance of the early years of competitive experience as identified by Connaughton et al. (2008). These results also support the belief that elite athletes have expressed regarding the importance of the experiences they had encountered during their formative stage of development on their path to becoming mentally tough (Bull et al., 2005; Connaughton et al., 2008; Thelwell et al., 2005; Thelwell et al., 2010).

Conversely, the pre- and post-test MeBTough scores were not significantly different. Thus, the mental toughness abilities of these wrestlers did not change over the course of a 3-month high school competitive season. In fact, the mean scores were almost identical (e.g., 140.3 & 140.4) highlighting the stability of mental toughness over this time frame. Based on these results, it would appear that short-term training and competitive experiences are not enough to make a significant change in the mental toughness abilities of young athletes.

Finally, the correlation between mental toughness and years of wrestling experience was not significant. Perhaps experience dedicated specifically to wrestling is not critical for the development of mental toughness in wrestlers. Coupled with the non-significant relationship with the number of months spent wrestling each year, it might be that it is more beneficial to experience a multitude of environments that provide a wide variety of developmental opportunities. This would support the contention that young athletes be provided maximum opportunities and training environments both in and out of sport to develop their mental toughness abilities (Bull et al., 2005; Thelwell et al., 2010). Perhaps restricting these youth sport experiences to a single sport is not necessary or perhaps even ideal for developing mental toughness. Another plausible explanation is that the average wrestling experience
of this particular group was fairly low, with most of them being involved in wrestling less than five years. Connaughton et al. (2008) would have classified these wrestlers as being in the early years of their competitive experience. The results may have been different if the sample would have represented all three phases of life (i.e., early, middle, and later years).

Interpreted collectively, mental toughness abilities do seem to be developed over time. However, these abilities do not change over short periods of time. Rather, mental toughness abilities are developed slowly over multiple years. A cursory examination of the mean MeBTough scores shows an increase of four to seven points each year from the freshmen to senior grade level (see Table 1), resulting in the only significant difference being found for the two age groups that were four years apart (i.e., $m = 130$ for freshmen and $m = 149$ for seniors). This would suggest that athletes' mental toughness abilities continue to improve throughout their high school career and substantial changes in mental toughness take years to achieve.

Though exploratory in origin, another interesting finding was the significant relationship between mental toughness and wrestling success. Mental toughness scores were positively correlated with season winning percentage and there was a significant difference in the mental toughness abilities of wrestlers having winning and losing season records. Thus, successful athletes tended to have higher mental toughness scores. This empirically reinforces the importance of mental toughness for achieving athletic success (Gould et al., 2002; Loehr, 1994) and confirms wrestling coaches' identification of mental toughness as a critical attribute of successful wrestlers (Gould et al., 1987). These results also provide additional validity evidence of the MeBTough (Mack & Ragan, 2008). From a practical perspective, the positive correlation with success validates the prevailing philosophy that coaches should create and utilize activities designed to increase mental toughness. Based on existing research (Thelwell et al., 2010), these activities should include a wide variety of competitive experiences, psychological skills training, and a positive training environment focused on developing essential characteristics such as hard work, determination, and discipline.

While promising, this study is not without limitations. First, the validity of the MeBTough inventory used to assess mental toughness has not been established. At present, there are no predictive validation studies using this measure. Thus, empirical validation studies using other objective, behavioral measures of mental toughness are needed. Being able to recruit and retain 54 participants representing three teams was also a limitation. Despite repeated contacts with numerous schools, only three schools actually completed the study. Thus, future research needs to examine a larger, more diverse population that could include multiple sports. Another limitation was the relatively short length of time, one high school season, for data collection. The next logical step would be to conduct a study more longi-
tudinal in nature or examine the mental toughness abilities of wrestlers ranging in age from youth to older, elite performers. Finally, because of confidentiality agreements, no attempts were made to examine the results on a team-by-team basis to determine whether one coach or environment might develop mental toughness better than another. This is another important factor that should be investigated.

In conclusion, mental toughness appears to be a psychological skill that is positively associated with competitive success and takes years to develop. Thus, coaches and athletes should try to maximize the opportunities available for the development of mental toughness throughout the early and middle years of sport participation. Additional research following this line of inquiry is warranted.

References


