

PERCEPTIONS OF MENTAL TOUGHNESS IN ULTRAMARATHON
RUNNERS: A MIXED-METHODS APPROACH TO DEFINING,
UNDERSTANDING, AND DEVELOPING
MENTAL TOUGHNESS

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ABSTRACT

The purpose of this study was to accomplish three major objectives: to quantitatively understand the applicability of an existing list of characteristics of mental toughness to a population of ultramarathon runners, to establish a new definition of mental toughness specific to ultra runners, and to conduct interviews to understand experiences, examples, and development of mental toughness. A mixed-methods approach was utilized with online surveys and semi-structured interviews. Participants were ultramarathon runners who had completed at least one organized ultramarathon event of 50 miles or more, all of whom were at least 18 years of age.

The online survey yielded 408 completed questionnaires and 476 definitions of mental toughness in ultramarathon running. The online survey consisted of an open-ended question on defining mental toughness, and a list of 30 characteristics of mental toughness from Jones and colleagues' (2007) mental toughness study on elite athletes. The survey utilized a 5-point Likert scale, and a Basic Demographic Questionnaire in addition to questions relevant to running experience. The existing characteristics represented limited applicability to the population of ultramarathon runners, with most prevalent attributes on drive towards success, goal attainment, learning from failure, and coping under pressure. In the 476 definitions of mental toughness, the most prominent themes were persistence, perseverance, utilization of psychological skills, and adapting to environmental and duration-related obstacles.

Semi-structured interviews were conducted with 12 randomly selected ultramarathon runners. Interviews were designed to verify a raw definition of mental toughness in ultramarathon runners, identify traits of mentally tough ultra runners,

understand experiences and examples of mental toughness, and understand how mental toughness could be developed. Grounded theory was utilized to isolate themes; many factors emerged and were categorized based on research questions. The definition of mental toughness was supported with the addition of an emotional and perceptual component. Traits of mentally tough runners supported the traits found in the definitions of mental toughness. Experiences and examples of mental toughness included situations of using psychological skills and witnessing a runner overcome adversity. Lastly, development of mental toughness was most highlighted in social aspects of the ultra culture and experiences both in running and in life.

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CHAPTER 1

INTRODUCTION

“It has been said of the Western States Endurance Run that you run the first 50 miles with your legs, and the last 50 miles with your mind. My mental toughness would be tested like never before.” –Dean Karnazes

Ultramarathon runners, such as “the Ultramarathon man” Dean Karnazes, have inspired a spike in popularity of ultra-distance pursuits. The number of runners hitting roads and trails for any distance over a marathon (26 miles, 385 yards) has increased dramatically in the past decade (Hoffman, Ong, & Wang, 2009). Attaining a more thorough understanding of the ultramarathon running community revealed a more specific definition of what qualifies as a true ultramarathon event. For the purposes of the present study, the researchers examined runners who had completed at least one event of 50 miles or more. While ultramarathon running has increased in popularity, the sport’s participants have not been studied extensively (Krouse, Ransdell, Lucas, & Pritchard, 2011). The necessity to utilize this newly popular and unique sport population has never been more evident. Both the physical as well as psychological challenge of running an ultramarathon is undeniable.

To date, existing research has looked at other psychological components of ultramarathon running: personality attributes (Lindstrom, 1990; McCutcheon & Yoakum, 1983), psychological attributes which may hinder endurance (Tharion, Rauch, Strowman, & Shukitt, 1987), cognitive orientations (Acevedo, Dzewaltowski, Gill, & Noble, 1992), goal orientation and training habits (Krouse et al., 2011) and trait emotional intelligence (Lane & Wilson, 2011). Additionally, contributing research has evaluated athletic identity, personality components, and athletic identity in marathon runners. Other studies

have examined pain perceptions and strategies for overcoming the inevitable pain that comes with endurance running. (Hoffman, Lee, Zhao, & Tsodikov, 2007; Masters & Ogles, 2008). Studies have looked at utilizing strategies to overcome the physical and psychological distress of “hitting the wall;” among these methods were emotion-focused coping and cognitive strategies such as willpower and mental reframing (Buman, Omli, Giacobbi, & Brewer, 2008).

To expand on the psychological component in running, researchers found association and dissociation tactics utilized by endurance runners to improve performance (Weinberg, Smith, Jackson, & Gould, 1984). In early studies, association was identified as more common in elite athletes, while non-elite athletes dissociated more and associated less (Morgan & Pollock, 1977). This is important to note as many studies on psychological skills training (especially mental toughness) have consistently included elite participants (Connaughton et al. 2007; Gould, Dieffenbach, & Moffett, 2002; Morgan & Pollock, 1977), it would be safe to assume that different psychological skills are used and developed differently between elite and non-elite athletes.

Despite many investigations of psychological skills and characteristics in marathon runners, and the wealth of knowledge of the personality trait of mental toughness, research has not been conducted linking the two. Mental toughness has been described as being a personality trait (Bull et al., 2005; Nicholls et al., 2009). One definition of mental toughness emerged from a qualitative study by Jones and colleagues (2002): having the innate or developed psychological advantage that enables one to cope better than opponents with demands of sport; additionally, mental toughness involves being more consistent and better than an opponent in determination, focus, confidence,

and control under pressure. This definition mentions components such as competition, comparison to others, determination, and confidence, which are applicable when discussing personality.

Thus, an understanding of personality characteristics of marathon and ultramarathon runners would be beneficial. In addressing this, McCutcheon and Yoakum (1983) attempted to deduce personality attributes in ultramarathoners that differed from (lower distance) runners and non-runners. No significant personality differences among ultramarathoners, runners, and non-runners were found. A slightly more recent study revealed differences in personality characteristics between finishers and non-finishers of the 1989 Western States 100 Mile Endurance Run. Finishers ($n = 30$) scored higher on vigor and dedication to running, having completed more 20+ mile training runs. Non-finishers scored higher on mood states of depression and anger, which was not surprising as the profile was completed following the failure to complete the race (Lindstrom, 1990). Personality profiles of Iditasport Ultramarathon athletes revealed more extroversion, energy, and optimism (Hughes et al., 2003).

These findings contribute to our understanding of the psychology and mindset of ultramarathon runners and provide the foundation for attributes that contribute to mental toughness. Mental skills training programs, assessments, and themes have been researched in individual endurance and competitive team athletes (Morgan & Pollock, 1977; Sheard & Golby, 2006). Sheard and Golby (2006) found success in a psychological intervention program for elite swimmers. Results revealed improvement in participants' post-intervention positive psychological profiles. Overall, psychological skill development can contribute to improved athletic performance and have a positive

influence on athletes' self-efficacy, competency to cope, focus on task, and control over internal/external factors. (Jones et al., 2002; Krane & Williams, 2009)

Mental toughness has been defined and conceptualized in a variety of ways, and, given all the perspectives, the strongest to emerge is Jones and colleagues' (2007) definition and attributes, which built upon their original study with elite athletes in Jones et al. (2002). The need to clarify mental toughness in single-sport context has never been more evident. The foundation is set for studying the connection of the trait of mental toughness in the unique population of ultramarathon runners. Mental toughness has become a vastly popular term in both research and applied sport settings. Investigations have identified components of mental toughness, focusing on what athletes believe to be qualities of the mentally tough performer (Bull et al., 2005; Crust, 2008; Jones et al., 2002, 2007). Crust (2008) reviewed and examined the literature and concluded that the study of mental toughness has advanced in recent studies (Bull et al., 2005; Jones et al., 2002, 2007). Increasingly modern studies have consistently found trends and repetition of certain themes. Surrounding some of the lack of conceptual clarity in the research exists significant contributions and some agreement on key characteristics:

Despite different approaches to research involving both qualitative and quantitative methods, a number of key components are consistently reported, including self-belief, commitment, self-motivation, thriving on competition and challenges, retaining psychological control under pressure, resilience, perseverance, and focus or concentration. (Crust & Azadi, 2010, p. 43)

These common themes tend to differ based on sport climate and certain components may be more important than others. Ultramarathon running is unique due to the extreme long duration of training and competition, repetitiousness of the activity, and

environmental demands. This limits correlations with other sports; one such similar sport could be channel swimming with alike attributes, or ultra-endurance triathlons (Baker, Cote, & Deakin, 2004; Schumacher, 2011).

Ultrarunning differs from many sports in that completion of the event can be considered as much of a success as winning. The sheer vigor and determination it takes to complete an ultra-marathon is an important consideration for those who compete in this sport and for those who coach athletes in this sport. (Krouse et al., 2011, p. 2836).

Despite the wealth of data, there are gaps and limitations within the aforementioned research. It has been reported there is an overemphasis on working with elite athletes (Bull et al., 2005; Jones et al., 2002, 2007; Thelwell, Weston, & Greenlees, 2005), an evident assumption that certain athletes are mentally tough without objective measurement and, lastly, the issue of a lack of quantitative data (Crust, 2008). The present study will address some of these issues; non-elite ultramarathon runners will be included in the participants, an operational definition specific to ultra-endurance runners will be developed and, finally, a mixed methods approach will allow for a larger sample size and quantitative data. Jones (2002) also highlighted the need for more sport-specific evaluations of mental toughness, which have mainly been conducted in team sport environments.

Jones and colleagues (2002, 2007) have provided excellent support for their definition and conceptualization of mental toughness and have provided a model for additional research on qualitative analyses of mental toughness. Support for this definition and attributes has been verified in Thelwell and colleagues' (2005) investigation of mental toughness in soccer, as well as Connaughton and colleagues' (2007) study of elite performers. The original and most supported definition of mental

toughness, from Jones (2002), overemphasized the role of comparison and competition when applying these concepts to endurance athletes, such as ultramarathon runners. However, their follow up study in 2007, which included interviews with athletes, coaches, and sport psychologists, provides a more comprehensive and applicable definition and set of attributes. The attributes are broken down into four categories: attitude/mindset, training, competition, and post-competition, and encompass the following terms: belief, focus, long-term goal setting as a source of motivation, controlling the environment, pushing yourself to the limit, regulating performance, handling pressure, awareness and control of thoughts and feelings and, lastly, the ability to handle both success and failure. These are highly relevant when looking at athletes who compete in ultra races, and will be utilized in the quantitative component of the present study. Additionally, qualitative interviews will expand upon the Jones et al. (2002, 2007) definition of mental toughness and it will be examined if this definition is relevant for ultramarathon runners.

Just as it is a new challenge to excel to run an ultra from a traditional marathon, or move up from a 50-mile race to 100, researchers must address this new challenge to take the research to the next level as well. Bull (1989) conducted a unique case study of an ultramarathon runner, and served as a valuable member of an athlete's 500-mile journey through some of the most challenging terrain in North America. Bull provided great practical application of a structured psychological skills training program throughout this runner's expedition. This shows clear evidence of the importance and value of understanding psychological skills such as mental toughness in their role to improve an athlete's performance and success in completing a task such as an ultramarathon. Sport

psychology consultants can play a powerful role with a greater understanding of what mental toughness is, how it is conceptualized, and what factors warrant more focus.

Statement of the Problem

The goal of this study is to accomplish two objectives: first, to quantitatively examine a conceptualized definition of mental toughness (Jones et al., 2007), as it relates to ultramarathon running, and further the understanding of the term and traits in a sport-specific context. Second, to utilize qualitative methods to attain in-depth introspection on ultramarathon running experiences and the development of mental toughness.

Research Questions

The following questions are addressed in the study:

1. How applicable is Jones and colleagues' (2007) definition of mental toughness in ultramarathon running populations?
2. How would a large sample of ultramarathon runner's interpret and define mental toughness?
3. What are the most important traits of mental toughness in ultramarathon running?
4. What are some experiences and examples of mental toughness in ultramarathon runners?
5. Can mental toughness be developed and/or maintained in ultramarathon runners? If so, how does this happen?

Delimitations

The following delimitations were present in this study:

1. Only ultramarathon runners were examined in the study. This study does not represent athletes who participate in other ultra-endurance events such as multiple-ironman races, ultra-cycling, or channel swimming.

2. Only athletes who had completed an organized ultramarathon race of 50 miles or more were chosen for the study.

3. The population for this study did not control for any demographic factors such as gender, race, religion, or age.

4. Data were collected through questionnaires and semi-structured interviews. The results were delimited to the responses to the questions and interview information.

5. The participants were delimited to those who were self-reported ultramarathon runners; therefore, there may be a range in number of races completed.

6. The initial form of data collection was completed using an online questionnaire. Individuals without Internet were unable to participate.

7. Participants were gathered utilizing snowball sampling and purposive methods so were delimited to those athletes who could be reached using social networking contacts.

Limitations

The following limitations were present in this study:

1. The sample for this study was not procured through randomization; thus results may not be generalizable to the general population of ultramarathon runners.

2. Participation in this study was voluntary. Participants may not have encompassed a representative and random sample of competitive/ recreational ultramarathon runners.

3. Participants were required to reflect on past experiences, and these present interpretations may not be fully accurate as to their perceptions at the original time of the experience.

4. The quantitative phase of data collection involved attributes that had not been described by ultramarathon runners; therefore, some factors unique to ultramarathon running may have not been included.

5. The follow-up interview component was conducted at a different time following the questionnaire; this could present differing points in training in proximity to a race, different attitudes, and perceptions.

6. Bias tests were not administered; therefore, full accuracy of runner's responses could not be determined. Social desirability may have played a role in responses during the interviews.

7. Ultramarathoners completed the questionnaires independently, and it could not be ensured that there were no outside influences, social elements, or distractions which could influence their responses.

8. The present study utilized one strong definition and list of attributes of mental toughness (Jones et al., 2007); however, this does limit the application as opposed to using a collaboration of several definitions and attributes of mental toughness (See discussion).

Definition of Terms

The following terms were defined for use in this study:

Competitive: Self-described level of participation. Completing ultra races to compete with others, win, or beat prior-set personal records.

DNF (Did not finish): Inability to complete an ultra race by one's own will or race administrators request due to safety reasons. Runners may also DNF if they do not make aid station time cut offs, or entire race time cut off.

Grounded Theory: Qualitative research paradigm that involves conducting a study and allowing deductions to emerge from the data, rather than traditional hypothesis testing (Glaser & Strauss, 1967).

Mental Toughness: Mental toughness means having the innate or developed psychological advantage that enables one to cope better than opponents with demands of sport; additionally, mental toughness involves being more consistent and better than an opponent in determination, focus, confidence, and control under pressure (Jones et al., 2002).

Middle-duration: Runner who has been completing ultras for more than two years but less than 10.

Novice: Runner who has been running ultras for two years or less.

Post-competition: Stage following competition of awareness, and reaction to the outcome of the competition.

Psychological skills: A particular skill or strategy such as self-talk, goal-setting, dissociation/association, positive thinking, or focus/concentration as mentioned in component of defining mental toughness.

Race: Organized event of 50 miles or more

Recreational: Self-identified level of participation, one who runs ultras for reasons other than competition, for physical health, goal attainment, or personal reasons.

Ultramarathon: Any running race that is longer than the official marathon distance of 26 miles, 385 yards (McCutcheon & Yoakum, 1983). Such events can be measured in distance (100km) or by time (farthest runner after 24 hours).

Veteran: One who has been running ultras for 10 years or more.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

The objective of this study was to examine a conceptualized definition (Jones, 2002) and attributes (Jones, 2007) of mental toughness; also to establish a sport-specific definition of mental toughness and understand how mental toughness can be developed. The purpose of the following review of the literature is to examine prior research conducted on a) psychosocial aspects of ultramarathon runners; b) psychological components of marathon running and endurance athletes; and c) a broad understanding of mental toughness.

Psychosocial Components of Ultramarathon Runners

The number of runners entering marathons has rapidly increased in the past 20-30 years. The running community has also experienced an influx of individuals taking on races longer than the typical 26.2 miles (Road Runners Club of America, 2010). Any running event that is longer than a marathon can be categorized as an ultramarathon; these events traditionally fall into races of 50km, 50 miles, 100miles, or somewhere in between these distances that involve running from one landmark to another (American Ultrarunning Association, 2011). With the growth of this sport and popularization due to figures such as Dean Karnazes, the self-titled “Ultramarathon Man,” there exists a need for more research and practice in the field of sport psychology on working with this new population of “ultra-runners.”

Research on ultramarathon runners in the field of sport and exercise psychology is limited (Acevedo et al., 1992; Krouse et al., 2011; Micklewright et al. 2009). To date, no studies have been published encompassing the construct of mental toughness in ultramarathon running. However, some research has looked at psychological aspects of ultramarathon running. In the past year alone, there have been examinations on motivation, goal orientation, coaching and training habits of women ultramarathon runners (Krouse et al. 2011), Gender differences in competitiveness in ultramarathon running (Frick, 2011), and emotions and trait emotional intelligence in ultra-endurance runners (Lane & Wilson, 2011). For the purpose of this section, it was most sensible to present the research in chronological order, showing the evolution of information that has been built up to this point.

An early study attempted to find variations in personality among ultramarathoners, runners, and non-runners (McCutcheon & Yoakum, 1983). The researchers were unable to find significant personality differences in the three groups and drew attention to the need to employ additional measures. However, their analysis did reveal personality traits that were different from what they had anticipated than the: “stereotypical fanatic who is among the elite of the running community” (p. 179).

Personality traits were also investigated and differences identified between finishers and non-finishers (Lindstrom, 1990). In this study, 46 male runners completed the Edwards Personal Preference Schedule prior to the 1989 Western States 100 Mile Endurance Run. The participants were also administered the Profile of Moods States before the race and then at the finish or dropout point. Univariate results revealed that

finishers (n = 30) scored significantly higher on vigor in the post-race POMS.

Nonfinishers (n = 16) scored significantly higher on mood states of anger and depression.

Building on this initial research is a study done through the military on psychological attributes of ultramarathon runners and factors that impact performance (Tharion, Rauch, Strowman, & Shukitt, 1987). The demands of ultramarathon running are likened to the physical and psychological demands of military personnel. "Air assault, light infantry, and special forces may require a soldier to navigate cross country for a sustained period of 72 hours or more" (p. 1). Comparisons are made to trail runners and soldiers traversing distances over challenging terrain and in intense environmental conditions. The study sought to look at: mood states and physiological changes resulting from strenuous running for 50 miles; differing moods and symptoms between finishers and Nonfinishers; goals of participation as related to motivation level; lastly, ideal predictive factors of the best ultramarathon completion time.

Participants consisted of 44 registered entrants of the Massanutten Mountain Massacre 50-mile trail run. The participants completed a Performance Assessment Battery before and after (or at the drop-out point) of the run. The battery included a demographic questionnaire, Self-Motivation Inventory (SMI), Environmental Symptoms Questionnaire (ESQ), Profile of Mood States (POMS), and a test of Trait Anxiety. Data were first divided by researcher-titled "survivors" (n = 18), who completed the race, and "casualties" (n = 26), who were unable to complete the race. While prior race experience is important, nine "casualties" were reported from runners who had run 10 or more ultramarathon events. Goal statements included both outcome and process-orientations. The most frequent goal reported (n = 14) was to complete the race, followed by a more

performance related completion goal reported ($n = 13$) of finishing by a specific time. Four of the participants had increasingly subjective goals: “run my best effort,” “enjoy the run and make social contacts,” “train for the Old Dominion 100-miler,” and “to not get hurt.”

The researchers found that due to the nature of time-related check-points, many runners were forced to run faster. This may have added physical and psychological stress, which contributed to them being a “casualty”. The findings of this study were consistent with McCutcheon and Yoakum (1983) in regards to fast ultramarathon runners training with much higher mileage. Additionally, the data on mood responses agreed with Morgan and Pollock (1977), who had found that elite distance runners were able to check pain level, interpret physiological feedback, and monitor pace better through association than dissociation. The implications of this research on multiple psychological characteristics are broad, particularly beneficial to the military. “Learning to manage stress, utilizing the most advantageous training techniques, and the employment of goal-setting strategies are important to enhance human performance” (p. 27). Both the athlete and the soldier can appreciate the importance of psychological factors on endurance performance, and modern training approaches must include both physical and cognitive frameworks.

Ultramarathon events can vary depending on the level of support athletes receive, and the conditions faced in terms of terrain, weather, and altitude; thus these factors can increase the physical and psychological demands of the task. The Iditasport Ultramarathon is an unsupported 100-mile race in the Alaskan wilderness, which must be completed in less than 48 hours (Hughes, Case, Stuemple, & Evans, 2003). This race varies based on conditions, also on modality, as they have the choice to complete the

course using one of four methods of transportation; they can travel on foot, bike, or using snowshoes or cross country skis (Hughes et al., 2003). While this event is not exclusive to ultra-runners, personality components of these athletes would be comparable given the challenge of the event. The Iditasport participants scored significantly higher on both extraversion and openness (Hughes et al., 2003). A significant correlation was discovered between experience seeking and openness scores, implying that these athletes like being around people, often described as “active, assertive, energetic, and optimistic when compared to their peers” (p. 259).

One of the few studies looking at cognitive orientations in ultramarathoners examined sport-specific cognitions of 112 participants competing in a 100-mile trail run (Acevedo, Dzewaltowski, Gill, & Noble, 1992). Runners competed in two of the most challenging ultras in the country, the Western States 100-Mile Endurance Run and the Leadville Trail 100. The runners were asked to fill out the Sport Orientation Questionnaire (SOQ), The Trait Sport-Confidence Inventory (TSCI), the Commitment to Running Scale (CRS), and a final questionnaire on demographics and running experience.

Acevedo and colleagues (1992) found that the ultramarathoners ranked high in confidence and commitment to running. The participants ranked only slightly higher in competitiveness, lower on win orientation, and higher on goal orientation when compared to other athletes (Acevedo et al., 1992). An interesting finding was that responses to open-ended question revealed that most participants reported mostly externalized thought processes during the races, which contradicts claims of Morgan and Pollock (1977), and their findings of predominantly association over dissociation in “elite” runners.

Ultramarathoners also had “feelings of psychological well-being and strength as a result of their ultramarathoning, never or rarely experienced runner’s high, and experienced negative psychological states when unable to run” (Acevedo et al., 1992, p. 242).

Cognitive strategies used in training and during races, included visualization, pre-race preparation reading, goal setting, self-talk, and controlling one’s thoughts.

Additional comments from the participants involved a sense of adventure and excitement associated with the challenge of ultramarathoning. “The necessity for mental toughness and strength, a never-give-up attitude, was emphasized. Also mentioned was the mental roller coaster of extreme emotional high and low points that often occur during an ultramarathon” (Acevedo et al., 1992, p. 248). Overall, this study set out to build on the understanding of what it takes to compete in a 100-Mile mountainous race. The findings suggest that ultramarathon runners do exhibit sport-specific characteristics and responses; the participants surveyed placed more emphasis on personal standards and time goals rather than on winning or place-related goals (Acevedo et al., 1992).

This study helps establish a framework and draws attention to the need to understand experiences of ultramarathon runners; these individuals reported moments of extreme emotion and unique perceptions which allow them to complete arduous 100+ mile runs in harsh conditions (Acevedo et al., 1992). Descriptions reported were compared to what Maslow (1962) described as “peak experience,” or a high moment of emotional and self-actualization. These findings and additional sport-specific research can be highly beneficial to applied sport psychology consultants in developing individualized intervention techniques (Bull, 1989).

To focus on an extremely specific sample, a sport psychology consultant traveled with an ultra-distance runner as he attempted to complete a 500-mile course in 20 days across the deserts of North America (Bull, 1989). The consultant was requested as part of the athlete's "backup" team, which also consisted of an exercise physiologist and a paramedic. The athlete, titled "A" in the study, suggested in exchange for the sport psychology services to be a "scientific case study to investigate the psychophysiology of extreme environmental stress" (p. 254). The consultant utilized a four-phase model and documented the phases as: establishing rapport, forming a psychological profile, evaluating the demands of the situation and developing a mental training plan to meet these demands, and lastly, an ongoing progress evaluation and intervention for crisis situations (Bull, 1989).

The purpose of the article was to describe a successful intervention as a model for other sport psychology consultants, and demonstrate how the framework could be effective in guiding future interventions (Bull, 1989). Psychometric testing, psychological profiling, and interviews revealed "A" to be highly motivated, meticulous, focused on the task at hand; the participant also ranked higher on goal-setting, concentration, and confidence, but needed improvement of arousal management and somatic anxiety regulation (Bull, 1989). With this information, the consultant developed a program to include relaxation training. In one of the preparation phases, four weeks were spent teaching and practicing mental skills that would be needed during the 20 days expedition (Bull, 1989).

The strategies emphasized and practiced included imagery, relaxation, and association. Other issues addressed were coping (with the heat- both physically and

psychologically), thought patterns (associative versus dissociative), and exhaustion. To mentally deal with the heat, “A” was recommended by the consultant to utilize imagery. For the cognitive strategy, it was suggested to “A” that he use association as a means of controlling pace and self-monitoring (Bull, 1989; Morgan & Pollock, 1977). For the ongoing phase of evaluation and crisis management, the consultant served to help with performance review, relaxation, and to help “A” deal with mental health issues associated with the demands of the situation. The experience has implications on how to develop a mental skills action plan when working with an ultra-endurance athlete (Bull, 1989).

Emotional states are an important factor to sport psychology consultants in the sport of ultramarathon running, due to the long duration and physical as well as psychological challenges during training and races. Research shows that athletes have intense emotional experiences before, during, and following competition in ultra-endurance events (Bull, 1989; Raglin, 2007). In a more recent study, relationships were identified between trait emotional intelligence and emotional state changes during the course of an ultra-endurance race of approximately 175 miles completed over 6 days (Lane & Wilson, 2011). Trait emotional intelligence was described as a consistent construct that should predict adaptations in emotional states that are experienced during the race, based on psychological and physiological feedback (Lane & Wilson, 2011). Challenges to trait emotional intelligence, characteristic of ultra-endurance participation, can include insufficient energy intake, hydration, sleep deprivation, and alterations in cognitive states.

Participants revealed significant fluctuations in emotional states throughout the six-day race. Contrary to what the researchers hypothesized, the runners did not

experience an inverse iceberg profile; however, they did report significant changes in anger, calmness, confusion, fatigue, happiness, and vigor. In support of their hypothesis, results demonstrated “trait emotional intelligence was associated with pleasant emotions including higher calmness and happiness, coupled with lower anger, confusion, depression, fatigue and tension” (p. 360). Implications for these findings extend to athletes building awareness of emotions before, during, and after running events. With this, athletes can harness the location of this emotional strength and maintain better control, which can increase performance output (Lane & Wilson, 2011).

Micklewright and colleagues (2009) examined post-race mood changes, and sought to figure out if the variances were more associated with exertion or a discrepancy of the runners’ actual and predicted performance times. Eight male and two female runners were recruited from the entrant list for the Puffer ultramarathon, a rocky 73.4 km trail race between Cape Point and Cape Town, South Africa. Mood states were measured using a shortened version of the Profile of Mood States (POMS) questionnaire. Performance expectations were self reported by the participants two days prior to the race. Ratings of perceived exertion (RPE) were calculated using the 6-20 Borg scale at 13 checkpoints throughout the race.

The most important finding cited by the researchers was the change in POMS right before the start of the race showed elevated levels of confusion (Micklewright et al., 2009). This may have been attributed to differing cognitive appraisals and evaluations regarding their individual circumstances and readiness prior to the race. Interestingly enough, higher levels of tension were not reported. RPE was found to be more important to help with pacing, thus leading to more effective performance, than predicted

performance times. Finally, “for unknown reasons” (p. 172), endurance runners consistently made optimistic performance predictions, which provides implications for applied sport psychologists to assist ultramarathon runners with more accurate goal setting techniques. Even though Morgan and Pollock (1977) provided more information regarding cognitive orientations of association and dissociation. Future investigations were suggested to include more detail of cognitive performance appraisals during the race, and further understanding of how runners monitor progress and compare that with performance expectations.

Recent research has studied gender differences in competitive orientations within ultramarathon running (Frick, 2011). The article rejects the age-old premise that men are more competitive than women; data analysis revealed that the gender gap has been narrowing over the years. Through analyzing completion times, coefficient of variation in top performances, and demographic data, the evidence in the article clarifies the “culture-and-incentives-hypothesis,” over the older “biology-and-predispositions-hypothesis.” Thus, competitive pressures represented an equal effect on performance for men and women. While this research is limited due to the focus on top performers and the sociological construct of competition, implications can be suggested for broader gender gap issues in sport. Additionally, knowledge of gender differences can be beneficial for sport psychology practitioners when understanding unique and different challenges faced by male and female ultramarathon runners (Krouse et al., 2011).

To date, only one study has exclusively looked at the experiences of female ultramarathon runners. Krouse and colleagues’ (2011) conducted a comprehensive study on motivation, goal orientation, demographic characteristics, training habits, and coach

utilization of women ultrarunners. Recent studies on marathon running have shown that women runners cite motivational elements of social facilitation, recognition, and physical fitness more than achievement and accomplishment, as reported higher by men (Ogles, & Masters, 2003). Female ultramarathon runners are unique as their responsibilities typically involve juggling domestic duties, a family, and career. Knowledge of these factors can design more effective training goals and individualized strategies.

The purpose of the study was to develop a profile of female ultramarathon runners by building understanding of the following factors: motivation, goal orientation, demographics (age, job, family, etc.), training habits, and use of coaching. The most pertinent findings of this study were: many women were able to train on average over 12 hours a week, the strongest motivational sources reported were health and achievement, the women runners were more task than ego oriented, most set goals for events, and most of the participants did not use a coach. An interesting finding was that “ultrarunning women also differed from women marathon runners and masters athletes who strongly endorsed social reasons for participating in events”. (p. 2840) Women ultrarunners had higher task mastery goal orientations, some examples of task categories include: to win (age group placing), to compete a challenge (a new course, length, or finish in a specific time), and lastly to have fun, complete the race, and avoid injury.

Clearly, the literature on ultramarathon runners is moving in a positive direction, noted in the articles on the psychological components and characteristics of ultramarathon runners coming to publication in the past year (Frick, 2011; Krouse et al., 2011; Lane & Wilson, 2011). However, future studies could enhance the understanding of this sport, and provide valuable information for sport psychology practitioners when

working with ultramarathon athletes. A few specific areas of research that could be addressed include why individuals participate in ultra-endurance endeavors and how they change as a result (Hughes et al., 2003), comparisons between first time participants in ultra-events and race veterans (Hughes et al., 2003), studies with larger sample sizes (Lindstrom, 1990), multivariate approaches (Krouse et al., 2011), and what contributes to or deters from success, and how ultramarathon runners define success (Krouse et al., 2011). The central recommendation relevant to the present study is the need to identify and understand the psychological construct and trait of mental toughness in ultramarathon runners.

Psychological Aspects of Endurance Sport and Marathon Running

...it appears reasonably clear that endurance performance is governed by both the physical capacity and willingness of the runner to tolerate the discomfort associated with hard physical work (Morgan & Pollock, 1977, p. 383).

Morgan and Pollock (1977) researched psychological characteristics of elite runners and among major findings, uncovered mindsets, race strategies, reasons for running, and mental health characteristics of elite runners. The researchers cited the importance of the psychological component of long-distance running, and sought to examine the extent to which psychological factors play a role in describing the successful marathon runner. Participants completed a battery of psychological tests looking at trait and state anxiety, perception of somatic activity under stress, mood states, personality traits, attraction to physical activity, and perception of physical ability.

This pivotal study found that elite distance runners have similar moods to other elite athletes, but superior to that of the general population. The elite runners were also

not found to differ much on personality traits, thus it is stated that “positive affective profiles (states) reflect the consequence of involvement in distance running, not an antecedent or selection factor” (Morgan & Pollock, 1977, p. 399). It is concluded that elite marathoners are described as having positive mental health as a consequence of running and training. The question presented in later research is which comes first, the psychological component or the physical activity? Contrary to Morgan and Pollock (1977), is longitudinal research that shows that characteristics of sport participation are innate, suggesting there are certain attributes that may predispose individuals to be active (Raglin, 2007). Additionally, looking at mental toughness, one study found that many factors of the construct were correlated to genetics, thus predominantly innate. However, this link may be weak as the behavioral genetic study utilized non-athletic populations (Horsburgh, Schermer, Veselka, & Vernon, 2008).

Despite the controversial findings and the argument of nature versus nurture, the most important finding of Morgan and Pollock (1977) is the differentiation of cognitive strategies of elite versus non-elite runners. Non-elite runners were reported as increasingly dissociating from painful experiences, while the elite runners attempted to be in tune with their body and read physiological signs to adjust pace accordingly. The major distinction identified is that the elite marathoner uses associative cognitive strategies during competition.

In an attempt to build on these findings, Masters and Ogles (1998) examined association/dissociation as it is correlated with injury, motivation, and performance variables in marathon runners. However, the researchers are critical of the statement that dissociation can lead to more injuries due to a lack of awareness of pain and

physiological precursors to an injury (Morgan & Pollock, 1977). There exists little empirical evidence to make this suggestion and, instead, research shows that association is more common in competition, while dissociation used more frequently in training runs (Masters & Ogles 1998; Sachs, 1984). It is additionally noted that motivational factors such as competition, goal orientation, and achievement orientation, are correlated with association, with the opposite true for dissociation.

The more recent literature showed that the use of dissociation was not correlated with injury; in fact, associative strategy was actually more predictive of injury risk. (Masters & Ogles, 1998) Another conclusion was that runners use associative strategies during races to push themselves, but the injury results from performing at maximal levels, and dissociation was used more frequently in the safety of training runs. The limitations of this study were that injury occurrence was self-reported, and the lack of physiological data. A future study could compare associative and dissociative strategies with mental toughness and address which strategies would align with optimal mental toughness in training and competition settings.

In certain situations, effective use of association versus dissociation may be out of the question (Buman, Omli, Giacobbi, & Brewer, 2008). In situations of an athlete “hitting the wall,” mental toughness may play a stronger role, and alternative coping responses are needed in order to be successful in completion of a marathon. (Buman et al., 2008). This study brought awareness to the need to not just focus on elite participants, but the growing population of recreational marathon runners. Utilizing qualitative methods, this study sought to identify psychological characteristics and coping responses with “hitting the wall” (HTW). While Morgan and Pollock (1977) saw an infrequency in

encounters with “the wall” in their elite participants, the phenomenon was much more common in the larger sub-elite population of runners. The importance for this study is highlighted in the statistics on the growth of recreational marathon running, thus a growth in individuals HTW, and the need for sport psychology consultants to work with these runners in overcoming this obstacle.

Participants were 40 males and 17 females who were interviewed about characteristics of HTW, symptoms of HTW, and coping strategies. The results revealed, “mental reframing was used more often than associative and dissociative strategies combined” (p. 296). Another coping strategy relevant to the present study of mental toughness is the use of willpower, “thoughts of determination that allowed them to persist regardless of the physical and mental duress being experienced” (p. 296). Despite these findings, additional research is needed into the efficacy of coping strategies as related to HTW and overcoming adversity.

An interesting avenue to pursue would be the presence of HTW in ultramarathon runners, and if such a phenomenon exists, at what mile/point in a race? Additionally, what coping strategies are used to overcome these challenges? Understanding mental toughness as a trait to complete an ultramarathon event and overcome adverse circumstances can prove to be beneficial in response to HTW.

It is clear that there is a strong psychological component to the sport of marathon running (Connor, 2007; Raglin, 2007). To expand on Morgan and Pollock’s (1977) assertion that marathoners have better mental health than non-athletes, Raglin (2007) compiled a brief paper on findings of psychological research in marathoners and other endurance athletes. Enduring personality characteristics of marathon runners were

extraversion, positive health profiles, and lower scores on depression, anxiety, and neuroticism; there were also higher scores on emotional stability and vigor (Raglin, 2007). At this level, it is clear that research still lacks in understanding the trait of mental toughness and its' role in marathon running.

A limitation of the aforementioned research on psychological factors of marathon runners is the ability to generalize these findings to ultramarathon runners. Further research could include comparisons of the unique demands between marathon and ultramarathon runners. Areas to examine include personality traits, responses to stress, and coping strategies as these factors relate strongly to the mental toughness literature. Studies on the multifaceted construct of mental toughness would be highly beneficial to runners, coaches, and sport psychology consultants working with marathon runners.

Mental Toughness as a Construct

Mental toughness can be defined as “having the natural or developed psychological edge that enables you to: generally cope better than your opponents with the many demands (competition, training, lifestyle) that sport places on a performer; specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.” (Jones et al., 2002) While not the first (see Loehr, 1994), this is the most referenced definition for mental toughness to date (Bull et al., 2005; Connaughton, Wadey, Hanton, & Jones, 2008; Gucciardi, Gordon, & Dimmock, 2008; Thelwell et al., 2005). This initial study on mental toughness attempted to define the construct as well as identify attributes of the mentally tough performer. Qualitative methods were used in the interview process of 10 elite international performers. In later studies, this definition was utilized and confirmed in sport-specific

contexts, with cricketers and soccer players (Bull et al., 2005; Thelwell et al., 2005). The point was made that mental toughness may have some variations between sports, but there could be a consistent general template or framework that could be developed.

The central issue of this definition and conceptualization of mental toughness as related to the present study is the over-emphasis on competitive and comparison components, thus implying that athletes who do not beat their opponent or achieve ascribed success are not mentally tough (Gucciardi et al., 2009a). An alternative definition and set of attributes would be more applicable to athletes in long-term endurance activity in which success is described in forms of completion or achieving one's best in those circumstances.

Thus, Jones and colleagues (2007) attempted to expand on the existing literature of mental toughness and address recommendations from Jones et al. (2002). The researchers used a super-elite sample of athletes, but also included coaches and sport psychologists. The participants included a more endurance-athlete encompassing sample, with swimming, athletics, triathlon, and pentathlon represented, in addition to boxing, judo, rowing, squash, cricket, and rugby. While Jones and colleagues' (2002) definition was verified, a new list of attributes was established with less weight put on comparing self to others and competition. The 30 attributes were organized into four separate dimensions: attitude/mindset, and three time dimensions (training, competition, post-competition) (Jones et al., 2007).

One important suggestion made by the participants was that they had a natural inclination to be mentally tough that was further developed through their athletic career (Jones et al., 2007). This brings to light the importance of describing mental toughness as

something that is more than just a personality trait or a psychological characteristic. In a behavioral genetic study of non-athletes, it was found that certain characteristics of mental toughness are more innate, but control and commitment as mental toughness variables have much more potential to be developed (Horsburgh, Schermer, Veselka, & Vernon, 2008).

Middleton and colleagues (2004), have a slightly different perspective on mental toughness. While utilizing the same participant population, they sought to develop a definition of mental toughness in its raw form, as opposed to how Jones et al., (2002, 2007) established what mental toughness allows one to do. Additionally, Middleton et al. (2004) wanted to conduct a study on mental toughness with a theoretical standpoint. One of the most relevant findings was that mental toughness seemed to exist in response to adversity, which brings awareness to the need to identify the link between mental toughness, optimism, and coping (Nicholls, Polman, Levy, & Backhouse, 2008).

Middleton et al. (2004) found parallels to previous research in regards to factors of mental toughness: Self-efficacy or self-belief (Bull et al., 2005; Jones et al., 2002, 2007; Loehr, 1986), task focus or attention control (Jones et al., 2002, 2007), motivation, mental self-concept, and coping skills (Bull et al., 2005; Nicholls et al., 2008). The unique characteristic that emerged from this study was task familiarity (Middleton et al., 2004). It makes sense that an athlete may cope better with adversity and perform in familiar environments performing specific skills; this draws the need to expand this understanding of mental toughness into the ultramarathon running domain. In prior research, it was found that having completed multiple ultramarathon events did not always indicate success in future events (Tharion et al., 1987).

The major criticism of this early mental toughness research was the use of only elite performers, which proved to be a major trend in the mental toughness literature (Bull et al., 2005; Connaughton et al., 2010; Connaughton, et al., 2008; Crust, 2008; Jones et al., 2007; Middleton et al., 2004b; Thelwell et al., 2005).

Additional research on mental toughness as looked at correlates to: physical endurance (Crust & Clough, 2005), optimism, pessimism, and coping (Nicholls et al., 2008), determinant factor of beliefs, pain, and adherence in injury rehabilitation (Levy, Polman, Clough, Marchant, & Earle, 2006). Across multiple studies, the importance lies in developing a sport-specific or at least sport-type specific definition of mental toughness and ways in which it can be developed. This information can benefit athletes and sport psychologists in understanding the unique demands of a sport such as ultramarathon running.

The strength in much of the mental toughness literature lies in the comprehensive methodology, while qualitative studies have led to definitions and attributes (Connaughton et al., 2008; Crust, 2008; Jones et al., 2002, 2007; Middleton et al., 2004; Thelwell et al., 2005), quantitative analysis has increased awareness in broader contexts and testing of mental toughness measurement tools (Crust & Swann, 2010; Gucciardi et al., 2009; Nicholls et al., 2008; Nicholls et al., 2009; Sheard, Golby, & van Wersch, 2009). An aim of the present study is to gather both qualitative and quantitative data to broaden the understanding of mental toughness in a sport specific context.

Crust (2008) provided a valuable review and conceptual examination of the mental toughness literature and some suggestions were to develop more innovative approaches. The present study aims to utilize a mixed method approach, while

developing a quantitative questionnaire based on attributes rather than an existing measure. Also, there has not yet been an examination of this kind of ultramarathon runners, or even marathon runners. Mental toughness can have different meanings to different athletes depending on the demands of their sport (Crust, 2008). Bull et al. (2005) had suggested that there is a difference between “pressure mental toughness” and “endurance mental toughness,” and a third category associated with physical danger. A conceptualization of endurance mental toughness would be highly beneficial to eliminate the lesser-relevant factors in other forms of mental toughness.

While developing a general definition may be helpful, sport psychology practitioners benefit from knowing the athletes’ needs and demands unique to that sport (Crust 2008). Future recommendations also suggest understanding mental toughness as a broader personality trait, which has influence both inside and outside of sport, and implications for developing mental toughness in life (Gould, Dieffenbach, & Moffett, 2002). To bridge the gap between theories and practice it is suggested to recognize observable behavior in mentally tough performers (Crust, 2008).

The construct of mental toughness has been approached from many directions, but there certainly lacks an analysis in endurance and recreational athletes. To date, no studies have been done on mental toughness in ultramarathon runners.

CHAPTER 3

METHODOLOGY

The objective of this study was to establish an ultramarathon-specific definition of mental toughness, examine a cited existing definition (Jones, 2007), and understand the application and development of mental toughness in ultramarathon runners. This chapter includes: (a) research design, (b) participants, (c) instrumentation, (d) procedures, and (e) data analysis.

Research Design

The research design involved a mixed-method approach to further the understanding of mental toughness in the context of ultramarathon running. The initial data were gathered through a web-based survey that included questions based on Jones and colleagues' (2007) attributes of mental toughness. These 30 attributes were broken down into four categories of questions on attitude/mindset, training, competition, and post-competition. Additionally, demographic data were gathered utilizing a Basic Demographics Questionnaire, with additional questions about ultramarathon running experience.

For the qualitative phase of the study, participants from the web-based survey were asked if they would be willing to participate in a follow-up interview to gather more in-depth information on their perceptions of mental toughness. An expert panel of graduate-level students/professionals in sport psychology, and those familiar with psychological skills in running/ultramarathon running, was used to determine effectiveness of measures and questions. Temple University's Institutional Review Board granted permission to conduct the study (Protocol number 20359).

Participants

Participants were gathered via snowball sampling, social networking, and through listservs. The sampling methods were utilized with the goal of attaining a diverse sample and avoiding only accessing geographically specific ultramarathon runners. The sample size included 408 ultramarathon runners who completed the survey, of the total 804 surveys (51% completion rate). The completion rate is analyzed further in the discussion section. All participants were at least 18 years of age. The central criterion to participate in the study was the completion of at least one ultramarathon event. This involved individuals who had completed at least one event 50 miles or longer, even though the IUA describes an ultramarathon event as anything longer than a marathon. The purpose of this study was to attain perceptions of consistent ultramarathon runners and that excluded runners who had only completed one race, or a race that is the lower limit of the ultra running distance (i.e., 50k event). This justification was established from an understanding of the ultramarathon running culture which focuses on races at or longer than 50 miles.

Listservs, Social networking, snowball sampling, and listservs were employed to identify potential participants. The second phase involved qualitative interviews with 12 participants. Of the total participants who agreed to be contacted for the follow up interview (359); groups of 10-12 participants were selected randomly and emailed. 40 participants were emailed total to yield 12 runners that responded in a timely manner. This sample proved to be closely representative of the entire sample in regards to age, gender, years spent running ultramarathons, number of races (1-50+), and self-reported placement on the very competitive to very recreational continuum.

Instrumentation

The participants completed a questionnaire developed from Jones and colleagues' (2007) attributes of mentally tough performers. Ultramarathon runners were asked to describe the extent to which they agreed with descriptive characteristics of mentally tough ultramarathon runners on a five-point Likert scale (See Appendix D). This was used to further examine Jones and colleagues' (2007) proposed definition, and concurrently develop a conceptualization of mental toughness in ultramarathon runners. It is important to note why an existing measure of mental toughness was not utilized. The exploration of mental toughness is still relatively new; many of the measures for mental toughness are not yet structurally anchored in both psychometric validity and reliability. The researcher in this investigation sought to use raw attributes and phrase questions based on actual respondents from Jones and colleagues' (2007) study. The questions were phrased to be specific to ultramarathon runners, with the content of each attribute retained. This was done to understand the ability to apply the existing definition to the population of the present study. Thus, instructions asked the participants, "*In regards to (attitude/mindset; training; competition; post-competition), mentally tough ultramarathon runners posses/exhibit the following characteristics...*" The characteristics were grouped based on stage and clustered such that the runner answered three to five questions at a time.

It is important to note that the objective of the present study was not to add psychometric value to an existing measure, but rather examine a past, frequently cited definition, and assess the applicability to an ultra endurance population. The attributes in

the present study were selected because of the limit of the competition or comparison-based terminology, which was more apparent in previous definitions (Jones et al., 2002).

Basic Demographic Questionnaire

Primary and relevant demographic questions were asked prior to the mental toughness questionnaire. Participants were asked to provide personal demographics such as age, gender, ethnicity, and level of education. The participants were also asked to report the number of years they had been running, number of years they had been running ultramarathon distances, and distances completed in organized event(s). These questions were open-ended to allow runners to provide information as was felt appropriate.

Semi-Structured Interviews

Semi-structured interviews were conducted with each of the volunteer participants (12) to gain a thorough and comprehensive understanding of perceptions of mental toughness and how it is developed in ultramarathon running. Two interviews were conducted in person; the remaining ten were over the phone. All interviews were transcribed verbatim and sent back to the participants as per a partial Delphi method. At this time, participants could remove any information they wished, and add any elaboration on their responses. Data from interviews were analyzed using grounded theory to identify themes. The interview procedure was based on the grounded theory concept of data collection and data analysis happening concurrently (Corbin & Strauss, 1990). This method deviated from prior mental toughness research, (Gucciardi et al., 2009; Jones et al., 2002), which utilized personal construct theory (Kelly, 1955).

The purpose of grounded theory was to allow for more theoretical freedom when studying a population that has not yet been looked at through the mental toughness lens.

Middleton and colleagues (2004b) cited using grounded theory as a major strength in their qualitative investigation of mental toughness in elite athletes; in this method, findings are generated “in intimate relationship with the data, with the researchers themselves as instruments for developing that grounded theory” (Strauss, 1987, p. 6). Grounded theory was further relevant in studying mental toughness in the present study because it provided the researcher the opportunity to learn from the participants themselves (as opposed to just the data), and how to interpret and process what mental toughness is in ultramarathon running. This bolstered the analysis process as the researcher gained a deeper understanding of the context of ultra running and the ultramarathon running culture and community.

All questions asked of the participants were open-ended, and allowed for ultramarathoners to provide perceptions of mental toughness, while also elaborate on their experiences and provide examples. Utilizing semi-structured interviews has been a recurring method in the sport-specific mental toughness research (Gucciardi et al., 2009; Thelwell et al., 2005). In a study looking at mental toughness in soccer, the semi-structured interviews involved attaining a definition of mental toughness within soccer, comparing that definition to Jones et al. (2002), and exploring participants’ perceptions of attributes of mentally tough soccer players (Thelwell et al., 2005). The present study employed similar tactics; participants were asked to: evaluate the definition of mental toughness that emerged from the online survey in the first phase of the research project. Additional questions allowed participants to expand on attributes of mentally tough ultrarunners, describe examples of mental toughness in their own ultra running, what

mental toughness looks like in other runners, and lastly report how mental toughness can be developed in ultramarathon running.

Procedure

Participants were gathered via the ultra list (ultra@listserv.dartmouth.edu), the sport psychology listserv (Sportpsy@temple.edu), social media and emailed contact of ultramarathon clubs nationwide, and ultrarunning acquaintances of the researcher. For the initial quantitative component of the study, the participants were contacted electronically and provided with a link to the survey on www.surveymonkey.com. The link was sent out with a description and purpose of the study.

The first section of the online survey included an informed consent form, which described the potential risks and benefits of participation. Information about IRB approval was also provided in this initial section (IRB Protocol Number: 20359). The survey was available for participants to complete for a two-week period. The survey started with a basic demographic questionnaire with questions relating to their running and ultra running experiences. Following demographic questions, the runners were asked the number of years they had been running, number of years running ultras, and to list what ultras they had completed. Participants were asked an open-ended question as to how they would define mental toughness in the context of their ultramarathon running participation. Following this stage, the participants completed the survey based on the attributes of Jones and colleagues (2007). Lastly, participants were asked if they would be willing to participate in a follow-up interview (Phase Two: Qualitative) to gain a deeper understanding of their perceptions of mental toughness, and how it is developed in ultramarathon running.

Participants (N = 359) that provided emails and permission to be contacted for the second phase of the study were evaluated in a separate database. From this large sample, three rounds of 10-12 participants were randomly selected using a random number generator and contacted for phase two of the study. The researchers contacted 40 participants total to yield 12 participants that responded in a timely manner. These participants were given pseudonyms in the data. The 12 final interviewees included nine males and three females. The age range was 24 to 78. The interviewees had a wide array of ultra running experience, some had been running ultras for less than a year, and the most experienced had been completing ultras for over 30 years. The participants had completed anywhere from one to over fifty ultras.

The researcher conducted practice interviews with colleagues to ensure appropriate wording of questions, and to minimize potential for technological difficulties. All of the interviews had consistent questions, but allowed freedom of further probing questions to permit the participants to expand further on their experiences. The interviews were transcribed verbatim within two to three days and transcriptions were sent back to the interviewees as consistent with a modified Delphi method. The participants had the opportunity to confirm or make modifications to their statements and responses to questions and then sent revised transcripts back to the researchers, fewer than half the participants responded with corrections or additions, all of which were relatively minor. The final transcriptions were then coded by the researcher, with transcriptions additionally coded by two graduate-level colleagues to verify completeness of the coding process. The colleagues are sworn to confidentiality and interviewees were notified that their data would be anonymous among the colleague-assisted coding process.

Bias Statement

I am a 23 year old, Caucasian female Exercise and Sport Psychology Master's student in the Kinesiology program at Temple University. I have been a runner since age 12, but participated in soccer, softball, and volleyball starting at age 5 and through the start of high school. I ran for my high school in both track and cross-country team for three years. I ran sporadically throughout my college years, and began a more consistent running regimen upon moving to Philadelphia and starting graduate school at Temple. Even through stages of wavering, I find running to be the most consistent and enjoyable form of physical activity in my life. I run for physical fitness, to live longer, but most importantly to escape stress and anxiety. I always feel more positive and can evaluate situations clearer after a run.

I would consider myself a member of the running community, and aspire to continue to take my running to the next level. I completed my first marathon in November 2011 and have signed up for my first ultra (50k) in June, 2012. Since I choose to define an ultra as 50 miles or more, I would like to complete the JFK 50-Miler in 2013. I have awareness of the demands of running, both physically and psychologically and am thankful for the psychological skills learned through coursework; positive self-talk has carried me through many runs.

Originally, I had considered studying marathon runners and mental toughness, but changed to ultramarathon runners after a few coincidences of meeting ultramarathon runners. The summer between my two years of graduate school brought about a greater interest in ultra-distance events, and encounters with ultramarathon runners in my community, as well as meeting Dean Karnazes out of sheer luck. I took this as a sign.

Despite the long duration and challenges of the sport, ultramarathon running is not just for elite and/or competitive runners; for many, the goal is completion. As a recreational runner, I can relate to runners who define success and toughness as doing their best, finishing, and remaining injury-free.

Mental toughness as a construct has always intrigued me and I sought to study this trait in a sport in which the participants are assumed to be mentally tough. Even if this is true, a greater understanding of mental toughness in a sport such as ultramarathon running has yet to be conducted. The present research is personally beneficial to seeing if I can develop more mental toughness and be a more successful runner.

Data Analysis

The first phase of data collection involved analyzing the quantitative data based on Jones and colleagues' (2007) attributes of mentally tough performers. For the open-ended questions in this initial data collection, responses were coded and categorized by identified repeating and unique themes. The demographic information, data, and responses of willingness to participate in a follow-up study, were retrieved from Survey Monkey. Inferential and descriptive statistics were computed using SPSS analysis software. Descriptive statistics were utilized to describe the scores and means of the attributes and identify characteristics from the demographic questionnaire. Frequency and percentages of participants' responses for gender, age, ethnicity, education level, and participation description were calculated. Inferential statistics were used to identify relationships and distinctions of participants' responses to the attributes and demographic questions. Total scores, averages, and standard deviations were extracted for the 30

attribute questions, and themes collated from the open-ended question on defining mental toughness.

The qualitative phase encompassed transcribing the interviews verbatim shortly after being recorded; this allowed for triangulation and sending the transcribed information back to the participants for verification of accuracy of the responses. All of the 12 interviewees were sent transcriptions, and six responded with additions and/or minor modifications to their transcribed interview. Simultaneously, data were categorized and coded into themes. In accordance with Corbin and Strauss (1990), a multi-stage coding process was utilized to analyze the responses. As data were collected, the researchers used open coding to develop as many relevant themes as needed and organized responses into categories of quotations, using color-coding to differentiate each of the themes. Codes were confirmed by the researcher through consulting with colleagues, and allowing doctoral-level colleagues to read raw data and establish codes, these codes were confirmed with the researchers' original coding categories and themes. To further organize the data, an axial coding process took place to further understand and conceptualize the data through identifying repetitious, disagreeing, and unique themes. This step allows for the grounded theory to influence the development of hypotheses. Following this process, codes are compiled into sets and organized using a hierarchy.

CHAPTER 4

RESULTS

Introduction

The purpose of this study was to examine an existing definition of mental toughness in the context of ultramarathon running, establish a new definition of mental toughness in ultra running, identify traits of the mentally tough ultra runner, understand experiences of mental toughness in ultra running, and lastly, uncover how mental toughness can be developed in ultramarathon runners and the sport as a whole.

This chapter will include results and discussion of the quantitative and qualitative data in the following order:

- a. Quantitative results of online survey data
- b. Qualitative results of 476 definitions of mental toughness
- c. Qualitative results from semi-structured interviews
- d. Discussion of the data from the online survey
- e. Discussion of the qualitative data from definitions of mental toughness
- f. Discussion of data from semi-structured interviews
- g. General discussion

The following results section will be broken down into two initial sections, the first will examine the quantitative data from the online survey based on Jones and colleagues (2007) attributes of mental toughness. The second section will be two-fold. First, there is a qualitative analysis of 476 responses to the open-ended question from the online survey as to how ultramarathon runners define mental toughness. The second component includes a comprehensive qualitative analysis of 12 semi-structured

interviews with ultramarathon runners on experiences, traits of mentally tough ultra runners, and how ultramarathon runners have developed their mental toughness.

Online Survey Data

The objective of this study was to test the applicability of an existing definition and list of 30 characteristics of mental toughness. The definition that was tested was derived from a qualitative investigation of elite athletes, coaches, and sport psychologists (Jones, Hanton, & Connaughton, 2007). This research question was addressed through developing a survey based on these traits and including relevancy to identify if these characteristics were relevant to ultramarathon runners (Appendix D). This initial phase of the study utilized a large sample ($n = 408$) to test the existing definition, develop a new definition unique to ultramarathon running, and gain a more thorough understanding of the ultra running community. The data yielded 408 completed surveys, however, some questions were answered by as many as 468 participants and their answers were retained because they completed 80% or more of the survey. There were 804 participants who at least started the survey. The completion rate is further examined in the discussion section.

Demographic statistics are presented in Table 1. The sample included 68.6% (321) Males and 31.2% (146) Females. The age of participants ranged from 19 to 81, a mean age of 42.13 years \pm 10.796. The majority of participants identified themselves as White or Caucasian (92.3%), although a small percentage of the sample self-identified as Asian or Asian American (3.4%), Hispanic or Latin American (1.1%), American Indian (.9%), Black or African American (.2%), or Other/Not Specified (2.1%). The majority of the participants had attained some form of graduate degree (32.1%, $n = 150$), 30.3% had attained a college degree, 13.9% a doctoral degree, 13% a college degree, 9% some

graduate school completed, and a small percentage (1.7%) had only completed high school education.

The runners were asked to describe their ultramarathon running participation on a continuum ranging from very recreational to very competitive. Most runners identified their participation as “somewhere in between” (38.2%). However, a bell-curve emerged with 25.8% of runners describing themselves as competitive, 24.7% recreational, 5.8% very recreational, and 5.6% as very competitive.

TABLE 1: Descriptions of ultramarathon runners: Overall demographic variables.

	N	%		N	%
Gender			Education		
Male	321	68.6	High School	8	1.7
Female	146	31.2	Some College	61	13
Missing	1	0.2	College Degree	142	30.3
			Some Graduate School	42	9
Ages			Graduate Degree	150	32.1
18-24	14	2.99	Doctoral Degree	65	13.9
25-39	174	37.18	Missing	0	0
40-59	227	48.5			
60-69	24	5.13			
70 +	4	0.85			
Missing	21	4.5			
Ethnicity			Participation Description		
American Indian	4	0.9	Very Recreational	27	5.8
Asian/Asian Amer	16	3.4	Recreational	115	24.6
Black/African Amer	1	0.2	Somewhere in Between	178	38
Hispanic/Latino	5	1.1	Competitive	120	25.6
Caucasian/White	432	92.3	Very Competitive	26	5.6
Other	10	2.1	Missing	2	0.4
TOTAL	468	100	TOTAL	468	100

Participants had a broad range of experience; some had only been running ultras for a few months, others had been running up to 40 years. The range of experience in running ultras for most runners was 1-6 years (55.2%). Additionally, 12.1% of the sample had been completing ultras for less than one year, and 7.5% of the participants had been running ultras for over 20 years.

The participants were asked to what extent they agreed with the characteristics of mentally tough ultramarathon runners on a 5-point Likert scale. Table 2 includes all of the characteristics, mean rankings, and category to show phases from the list of attributes: attitude/mindset, training, competition/racing, and post-competition.

When analyzing the means, Likert scale choices closest to five indicate highest agreement with the trait. Several participants had missing data for various questions, but were still included in the analyses. The top three traits that received the highest mean overall were: *The ability to use failure to drive themselves to further success*: 4.3 (SD = ± .650); *When training becomes physically and mentally tough due to obstacles, they keep themselves going by reminding themselves of their goals and aspirations, and why they are putting themselves through this*: 4.26 (SD = ± .754); and, *the ability to recognize and rationalize failure and pick out the learning points to take forward*: 4.26 (SD = ± .640).

Traits that had the lowest means, meaning the participants agreed with them the least as characteristics of the mentally tough ultramarathon runner included *An inner arrogance that makes them believe that they can achieve anything they set their mind to*: 3.19 (SD = ± 1.253); *Thrive on opportunities to beat other people in training*. 2.40 (SD = ± 1.068); and *belief that achievement of their running goals is the number one priority in their life*: 2.37 (SD = ± 0.971).

TABLE 2: Ranked characteristics of mental toughness from strongly disagree (1) to strongly agree (5)

Question	Category	Mean	SD
The ability to use failure to drive themselves to further success.	Post-Competition	4.30	0.65
When training becomes physically and mentally tough due to obstacles, they keep themselves going by reminding themselves of their goals and aspirations, and why they are putting themselves through this.	Training	4.26	0.754
The ability to recognize and rationalize failure and pick out the learning points to take forward.	Post-Competition	4.26	0.64
Adapt to and cope with any change/distraction/threat under pressure.	Competition/Racing	4.23	0.656
Are not fazed by making mistakes, and can come back from them.	Competition/Racing	4.20	0.767
Have the patience, discipline, and self-control with the required training for each developmental stage to allow themselves to reach their full potential.	Training	4.19	0.799
The belief that they can push through any obstacle put in their way.	Attitude/Mindset	4.17	0.88
The ability to remain focused on processes and not only on the outcome.	Competition/Racing	4.17	0.708
The ability to use all aspects of a very difficult training environment to their advantage.	Training	4.16	0.766
Can cope with and channel anxiety in pressure situations.	Competition/Racing	4.14	0.678
The ability to know when to celebrate success and then to stop and focus on the next challenge.	Post-Competition	4.05	0.784
Total focus on the current ultramarathon event in the face of distraction.	Competition/Racing	4.04	0.777
The ability to rationally handle success.	Post-Competition	4.03	0.784
Raise their performance “up a gear” when it matters most.	Competition/Racing	4.01	0.792
The belief that their desire or hunger will	Attitude/Mindset	3.98	0.943

ultimately result in fulfilling their potential.			
The ability to remain in control and not controlled.	Attitude/Mindset	3.93	0.818
Question	Category	Mean	SD
The ability to remain committed to a self-absorbed focus despite external distractions.	Competition/Racing	3.90	0.837
The ability to use all aspects of a very difficult competition environment to their advantage.	Competition/Racing	3.86	0.806
Acute awareness of any inappropriate thoughts and feelings and change them to help perform optimally.	Competition/Racing	3.85	0.898
Have total commitment to their performance goal until every possible opportunity of success has passed.	Competition/Racing	3.85	0.862
An unshakable self-belief and total awareness of how they got to where they are now.	Attitude/Mindset	3.82	0.919
Can make the correct decisions and choose the right options that secure optimal performance under conditions of extreme pressure and ambiguity.	Competition/Racing	3.82	0.812
Have a love for the aspects of training that hurt.	Training	3.71	1.11
Refusal to be swayed by short-term gains (financial, performance) that will jeopardize the achievement of long-term goals.	Attitude/Mindset	3.57	0.922
Recognition of the importance of knowing when to switch on and off from ultramarathon running.	Attitude/Mindset	3.34	1.044
Love the pressure of competition.	Competition/Racing	3.27	0.966
Possess a killer instinct to capitalize on the moment when they know they can win.	Competition/Racing	3.24	1.026
An inner arrogance that makes them believe that they can achieve anything they set their mind to.	Attitude/Mindset	3.19	1.253
Thrive on opportunities to beat other people in training.	Training	2.40	1.068

Belief that achievement of their running goals is the number one priority in their life.	Attitude/Mindset	2.37	0.971
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Pearson correlations and independent samples t-tests were run to identify relationships among demographic variables and the survey of traits of mental toughness. Pearson correlations were utilized to examine the strength of relationships among the survey data and age, education level, and participation description (continuum from very recreational to very competitive). Independent samples t-tests were used for calculating statistically significant differences among responses based on gender and being at the extreme end of very recreational versus very competitive. Tests were run to identify differences in agreement to the characteristics of mental toughness in pursuit of examining whether the Jones and colleagues' (2007) list of characteristics of mental toughness are applicable to the ultramarathoning population.

Significant negative correlations were found between participant age and among the below listed mental toughness traits, thus, the older participants agreed with these traits less (see Table 3).

1. *The belief that they can push through any obstacle put in their way.*
2. *The ability to use all aspects of a very difficult training environment to their advantage.*
3. *Have a love for the aspects of training that hurt.*
4. *The ability to recognize and rationalize failure and pick out the learning points to take forward.*
5. *The ability to use failure to drive themselves to further success.*

6. *The ability to know when to celebrate success and then to stop and focus on the next challenge.*

TABLE 3: Correlation of Age to Characteristics of Mental Toughness

Characteristic	Correlation	Significance (2-tailed)	df
The belief that they can push through any obstacle put in their way.	-0.146*	0.002*	446
The ability to use all aspects of a very difficult training environment to their advantage.	-0.096	0.043	443
Have a love for the aspects of training that hurt	-0.281*	0.000*	443
The ability to recognize and rationalize failure and pick out the learning points to take forward.	-0.103	0.033	431
The ability to use failure to drive themselves to further success.	-0.126*	0.009*	431
The ability to know when to celebrate success and then to stop and focus on the next challenge.	-0.107	0.027	431

*All means were significantly different at $p < .05$. *Means were significantly different at $p < .01$ levels.*

Independent samples t-tests were run comparing responses between males and females to identify statistically significant mean scores where males agreed more than females or vice-versa (see Table 4).

For mental toughness **attitude/mindset (AM)** characteristic AM2: *An inner arrogance that makes them believe that they can achieve anything that they set their mind to*. Males (M(SD) = 3.27 (1.22)) reported significantly higher scores than Females (M(SD) = 3.01(1.31)). Also in attitude/mindset, for characteristic AM3: *The belief that*

they can push through any obstacle put in their way. Females (M(SD) = 4.3 (.76)) reported significantly higher scores than Males (M(SD) = 4.10(.93)).

TABLE 4: T-Tests Comparing Means of Males and Females for Characteristics

Characteristic	Means		<i>p</i>	<i>t</i>
	Males	Females		
<i>An inner arrogance that makes them believe that they can achieve anything that they set their mind to</i>	3.27 (1.22)	3.01 (1.31)	.039	2.073
<i>The belief that they can push through any obstacle put in their way</i>	4.10 (0.93)	4.30 (0.76)	.024	-2.265
<i>The belief that their desire or hunger will ultimately result in fulfilling their potential</i>	3.91 (0.95)	4.14 (0.91)	.014	-2.462
<i>When training becomes physically and mentally tough due to obstacles, they keep themselves going by reminding themselves of their goals and aspirations, and why they are putting themselves through this</i>	4.18 (0.77)*	4.44 (0.68)*	.000	-3.551
<i>Have the patience, discipline, and self-control with the required training for each developmental stage to allow themselves to reach their full potential</i>	4.13 (0.82)	4.31 (0.74)	.027	-2.223
<i>Love the pressure of competition</i>	3.35 (0.96)*	3.09 (0.95)*	.008	2.652
<i>Acute awareness of any inappropriate thoughts and feelings and change them to help perform optimally</i>	3.8 (0.91)	3.99 (0.86)	.040	-2.057
<i>The ability to know when to celebrate success and then to stop and focus on the next challenge</i>	4.0 (0.78)	4.18 (0.78)	.026	-2.237

All means were significantly different at $p < .05$. *Means were significantly different at $p < .01$ levels.

For characteristic AM4: *The belief that their desire or hunger will ultimately result in fulfilling their potential*, Females (M(SD) = 4.14(.91)) also reported significantly higher scores than Males (M(SD) = 3.91(.95)).

In regards to **training (T)**, mental toughness characteristic T1: *When training becomes physically and mentally tough due to obstacles, they keep themselves going by reminding themselves of their goals and aspirations, and why they are putting themselves through this*, Females (M(SD) = 4.44(.68)) reported significantly higher scores than Males (M(SD) = 4.18(.77)). Females (M(SD) = 4.31(.74)) also reported significantly higher scores than Males (M(SD) = 4.13(.82)) on training characteristic T2: *Have the patience, discipline, and self-control with the required training for each developmental stage to allow themselves to reach their full potential*.

Mental toughness characteristics relevant to **competition/racing (CR)** also yielded statistically significant differences between males and females. For characteristic CR1: *Love the pressure of competition*, Males (M(SD) = 3.35(.96)) reported significantly higher scores than Females (M(SD) = 3.09(.95)). Also, CR12: *Acute awareness of any inappropriate thoughts and feelings and change them to help perform optimally*, revealed significantly higher scores among Females (M(SD) = 3.99(.86)) than Males (M(SD) = 3.8(.91)). Lastly, in regards to **post-competition (PC)**, for question PC3: *The ability to know when to celebrate success and then to stop and focus on the next challenge*, included statistically higher scores for Females (M(SD) = 4.18(.78)) than Males (M(SD) = 4.00(.78)).

Independent samples t-tests were also conducted to compare the responses of those identifying themselves as either *very recreational* or *very competitive*. These tests were run to identify which characteristics resonated the strongest between these two ends of the ultramarathon running participation spectrum. Statistically significant differences

were found on only one characteristic in the training category, and six characteristics from the competition/racing category (Table 5).

For the **training** characteristic, T6: *Thrive on opportunities to beat other people in training*, very competitive (M(SD) = 2.88(1.34)) runners ranked higher than very recreational (M(SD) = 1.96(.94)) runners.

TABLE 5: Comparing Means of Very Recreational and Very Competitive Participants for Characteristics

Characteristic	Means		<i>p</i>	<i>t</i>
	Very Competitive	Very Recreational		
<i>Thrive on opportunities to beat other people in training</i>	2.88 (1.34)	1.96 (0.94)	0.005	-2.913
<i>Love the pressure of competition</i>	4.12 (0.77)*	2.59 (1.01)*	0.000	-6.168
<i>Can cope with and channel anxiety in pressure situations,</i>	4.50 (0.53)	4.11 (0.81)	0.049	-2.015
<i>Possess a killer instinct to capitalize on the moment when they know they can win</i>	4.04 (1.04)*	3.07 (1.14)*	0.002	-3.214
<i>Raise their performance “up a gear” when it matters most</i>	4.50 (0.65)*	3.81 (0.88)*	0.002	-3.221
<i>Total focus on the current ultramarathon event in the face of distraction</i>	4.38 (0.70)	3.85 (0.95)	0.024	-2.322
<i>The ability to remain focused on processes and not only on the outcome.</i>	4.54 (0.51)*	4.15 (0.53)*	0.009	-2.724

All means were significantly different at $p < .05$. *Means were significantly different at $p < .01$ levels.

In the **competition/racing** category, CR1: *Love the pressure of competition*, had significantly higher scores among very competitive (M(SD) = 4.12(.77)) runners than very recreational (M(SD) = 2.59(1.01)) runners. For CR4: *Can cope with and channel anxiety in pressure situations*, very competitive (M(SD) = 4.5(.53)) runners scored

significantly higher than very recreational (M(SD) = 4.11(.81)) runners. For CR7: *Possess a killer instinct to capitalize on the moment when they know they can win*, very competitive (M(SD) = 4.04(1.04)) runners reported significantly higher scores than very recreational (M(SD) = 3.07(1.14)) runners. For CR8: *Raise their performance “up a gear” when it matters most*, very competitive (M(SD) = 4.5(.65)) runners reported significantly higher scores than very recreational (M(SD) = 3.81(.88)) runners. For CR9: *Total focus on the current ultramarathon event in the face of distraction*, very competitive (M(SD) = 4.38(.70)) runners also reported significantly higher scores than very recreational (M(SD) = 3.85(.95)) runners. Lastly, very competitive (M(SD) = 4.54(.51)) runners reported statistically significantly higher scores than very recreational (M(SD) = 4.15(.53)) runners, on CR11: *The ability to remain focused on processes and not only on the outcome*.

Pearson Correlations were also run controlling for certain variables. Responses to the characteristics were analyzed in regards to age (Table 6) and gender (Table 7) while controlling for participation description. When controlling for participation, data showed that for most characteristics listed, as age increased, agreement decreased with the exception of one of the competition/racing characteristics, *Love the pressure of competition*.

Characteristic	Correlation	Significance (2-tailed)	df
The belief that they can push through any obstacle put in their way.	0.102	0.034	433
The belief that their desire or hunger will ultimately result in fulfilling their potential.	0.118	0.013	433
The ability to use all aspects of a very difficult training environment to their advantage.	0.129*	0.007*	433
Adapt to and cope with any change/distraction/threat under pressure.	0.094	0.05	433
Acute awareness of any inappropriate thoughts and feelings and change them to help perform optimally.	0.105	0.028	433
The ability to use all aspects of a very difficult competition environment to their advantage.	0.097	0.043	433
The ability to know when to celebrate success and then to stop and focus on the next challenge.	0.100	0.038	433

*All means were significantly different at $p < .05$. *Means were significantly different at $p < .01$ levels.*

When controlling for participation, the data show that females agreed more than males on seven characteristics (Table 7).

TABLE 7: Pearson correlations between gender and Jones and colleagues' (2007) characteristics of mental toughness, controlling for participation description.

Characteristic	Correlation	Significance (2-tailed)	df
The belief that they can push through any obstacle put in their way.	0.102	0.034	433
The belief that their desire or hunger will ultimately result in fulfilling their potential.	0.118	0.013	433
The ability to use all aspects of a very difficult training environment to their advantage.	0.129*	0.007*	433
Adapt to and cope with any change/distraction/threat under pressure.	0.094	0.05	433
Acute awareness of any inappropriate thoughts and feelings and change them to help perform optimally.	0.105	0.028	433
The ability to use all aspects of a very difficult competition environment to their advantage.	0.097	0.043	433
The ability to know when to celebrate success and then to stop and focus on the next challenge.	0.100	0.038	433

*All means were significantly different at $p < .05$. *Means were significantly different at $p < .01$ levels.*

Participation description was also correlated to agreement with characteristics of mental toughness while controlling for both age and gender (Table 8). Thus, these data represent which characteristics correlated highest with more competitive participants when controlling for age and gender.

TABLE 8: Pearson correlations between participation description and Jones and colleagues' (2007) characteristics of mental toughness, controlling for age and gender.

Characteristic	Correlation	Significance (2-tailed)	df
Belief that achievement of their running goals is the number one priority in their life.	0.145*	0.003*	413
The ability to use all aspects of a very difficult training environment to their advantage.	0.136*	0.005*	413
Thrive on opportunities to beat other people in training.	0.213*	0.000*	413
Love the pressure of competition.	0.312*	0.000*	413
Possess a killer instinct to capitalize on the moment when they know they can win.	0.185*	0.000*	413
Raise their performance “up a gear” when it matters most.	0.209*	0.000*	413
Total focus on the current ultramarathon event in the face of distraction.	0.146*	0.003*	413
The ability to remain committed to a self-absorbed focus despite external distractions.	0.117	0.017	413
The ability to use all aspects of a very difficult competition environment to their advantage.	0.112	0.022	413

*All means were significantly different at $p < .05$. *Means were significantly different at $p < .01$ levels.*

Online Survey Data: Defining Mental Toughness

From the total data of both complete and incomplete surveys, 476 participants answered the question: *The existing research on mental toughness has revealed many different definitions of mental toughness. How would you define mental toughness as it pertains to your ultramarathon running participation? Feel free to provide examples.*

The objective of these data was to develop a conceptualized definition of mental toughness that is most relevant to ultramarathon runners. Additionally, these data also provided traits or components of mental toughness in ultra running, which are supplemented and supported by the question on traits of mental toughness in the semi-structured interview phase of this thesis.

Upon initial collection of these data, 100 definitions of mental toughness were randomly selected to establish a raw definition to be used as a question in the semi-structured interviews. This definition allowed interview participants to critically examine if this definition was applicable, and make suggestions for change. Additional information on the definition is provided in the results section for the semi-structured interviews. The initial definition that emerged from coding 100 definitions was: *Mental toughness is the ability and awareness that allows a runner to persist and push beyond physical, psychological, and environmental limitations for an unconventionally long duration of time in both training and competition.*

In the final coding stage, all 476 definitions (Appendix C) were read; categories and themes were then established; the researcher identified consistent themes. The researcher used a grounded theory approach (Corbin & Strauss, 1990), and coding consisted of a three-phase process. The first phase involved reading all of the definitions of mental

toughness to gain a holistic perspective. Conceptual themes were formed in the second phase through identifying consistent themes in the open coding process of analysis. A doctoral-level colleague familiar with the ultra community, and context of mental toughness, assisted in the coding process by checking to ensure codes were a sufficient interpretation of the data. During this axial coding, 40 initial codes emerged from similar responses. The last phase involved grouping these codes into three larger categories: persistence, psychological skills, and external/environmental factors. An additional category, entitled Other, was added to include pertinent but less frequent themes, such as runners discussing the link between mental toughness in ultra running to mental toughness in life.

Upon further review, some themes were combined into one, such as internal and external focus, enduring/overcoming pain and embracing pain; and, lastly, social support and competition were grouped together under the title of social aspects. The final result yielded 37 individual themes clustered under four categories. Themes are listed in rank order by frequency in the visual representation in Table 9.

Themes were defined based on participant responses and were grounded in the data collected. These definitions are specific to the sport of ultramarathon running and perceptions of 476 ultra runners who answered the question. The UMR number refers to the ultramarathon running participant number when definitions were listed in alphabetical order by definition (see Appendix C for all 476 complete definitions). The excerpts, or sections of definitions, are provided as examples of each theme.

TABLE 9: Qualitative data from coding process of definitions of mental toughness.

Themes	Categories	
Exceeding perceived physical limitations (79)		
Pain: Overcoming/enduring/embracing (56)		
Keep going/Moving forward relentlessly (42)		
Overcoming/ignoring perceived physical <i>and</i> mental limitations (27)		
Persevering through most challenging (25)	Persistence and Perseverance	
Not stopping/not quitting (25)		
Finishing (25)		
General persistence (17)		
Perseverance towards a goal (14)		
No DNF (5)		
Emotional/mental control (40)		
Focus (33)		
Running Smart (26)		
Goal pursuit (25)		
Confidence/Self belief (15)		
Self talk/mantras (14)		
Positive outlook/attitude (10)	Psychological Skills	
Dissociation (9)		
Presence (8)		
Awareness/perspective (7)		
Drive/motivation (6)		
Patience (2)		
Relaxation (2)		
Flow (2)		
Physical Training/conditioning (22)		
Time/Duration (21)		
Adverse conditions/conquering course (19)	External/ Environmental Factors and Preparation	
Mental training (9)		
Social aspect/competition (7)		
Logistical planning (5)		
Loop race (2)		
Achieving the impossible/thought incapable (17)		
Not MT (7)		
A requirement (6)	Other	
MT in UMR/Life (3)		
Quitting is harder than enduring the pain (2)		

Many definitions encompassed multiple aspects that fell into multiple larger categories and included numerous themes, such as:

Mental toughness is the ability to transcend physical pain as well as environmental adversity while working through varying strengths and weaknesses in route to obtain a goal. Often times, it takes creativity and utilization of both your body and resources to continue towards that goal. (UMR 243)

Persistence/Perseverance, as a category, encompassed almost 50% of the total responses. Within that category, themes involved exceeding perceived physical and mental limitations, persisting through challenges, references to pain, relentless forward motion, never quitting, and finishing.

The first theme, *Exceeding perceived physical limitations*, came up by far the most frequently in the definitions as a whole. This theme can be defined as an element of mental toughness that is related to overcoming perceived physical limitations, including fatigue. Many participants simply talked about going beyond, pushing through, or exceeding limitations. However, limitations must be perceived if the participant is able to overcome them.

...Mental toughness in this sport relates to pushing through mental and physical fatigue. (UMR 104)

The ability to be able to push through the moments when you just want to stop. (UMR 350)

The ability to continue to push hard when feeling tired. (UMR 358)

The ability to will oneself after complete physical exertion has taken over. To make your body keep running while wanting nothing more than to curl in a ball, and sleep. (UMR 424)

The second theme included references to pain. This included *enduring, overcoming, and embracing pain*. Because runners also referenced the importance of identifying what is “injury pain” versus “regular pain.” It is important to note that regular pain in this context could be identified as extreme fatigue. Additional clarification of the pain to fatigue continuum is provided in the discussion section.

At Cascade Crest (100 Mile Endurance Run), I was injured at mile 20- both ankles. Mental toughness there was about continuing to run in spite of the pain. (UMR 29)

Mental toughness is pushing through incredible pain and fatigue because quitting hurts more. (UMR 105)

Being able to control, celebrate, and embrace pain as a welcomed reality of life. (UMR 50)

Many participants talked about continuing to run no matter what, and described mental toughness as the ability to *keep going*, and have *relentless forward progress*.

Mental toughness is the ability to keep on moving forward no matter what. (UMR 239)

(Mental toughness is) that quality I look for and rely upon... that keeps me moving forward. (UMR 342)

Just keep moving even when you are tired and way behind everyone. (UMR 176)

The fourth theme is in reference to participants defining mental toughness as the ability to supersede both *mental and physical limitations, or ignore signals from the mind/body/both to stop*. This was grounded in the data as a step beyond exceeding perceived physical limitations, encompassing mental limitations (to a higher degree than mental fatigue). Additionally, many participants discussed that mental toughness allowed them to ignore messages from both their mind and body telling them to stop or to quit.

The ability to keep pushing when your mind and body have teamed up to convince you that you should quit. (UMR 383)

The mental fight of when your mind and your body says stop, but you know you can keep going. (UMR 434)

Mental toughness is the ability to continue on when every fiber in your body is screaming “STOP!” but your spirit enables you to fight through the pain, and finish what you started. (UMR 226)

Mental toughness was also defined as the ability to *persevere or push through the most challenging parts of the race*. These themes were chosen from references to overcoming environmental adversity, which is discussed under the environmental/external factors category.

Mental toughness is the ability to persevere through the most challenging parts of a race. (UMR 1)

Persevering when things inevitably begin to get more and more difficult later in a race. (UMR 301)

Welcome the challenges of extreme physical, mental, emotional, and spiritual duress that will occur in the course of running 100 miles. (UMR 467)

The fifth theme in the definitions that emerged was that mental toughness in ultra running means *not/never stopping, quitting, or giving up*.

Mental toughness is being able to continue running without stopping or quitting. (UMR 209)

Never quitting no matter how tough it gets. (UMR 279)

Participants cited as the ability to simply *finish* an ultramarathon as a major component of mental toughness.

...Need to want to finish more than life itself! (UMR 315)

The ability to press on and finish without succumbing to exhaustion or the desire to quit. I've always finished an ultra no matter how tired. (UMR 402)

The additional theme of *persistence, perseverance, consistency, and stubbornness* was found in the definitions of mental toughness. These characteristics were not as congruent with the other themes, but were grounded in the same general category.

...You persevere. It's the same thing that pushes winners across the finish line first, and the back o' the packers under the cut off. (UMR 325)

Combination of above average perseverance/tenacity/stubbornness... (UMR 55)

Within the category of persistence and perseverance, the theme of *persevering towards a goal* emerged. It was important to distinguish this from the psychological skill of goal setting as the stronger concept here was the persistence and determination to reach the goal in the given ultramarathon running event. The ability to relentlessly pursue this goal was the action in describing how mental toughness was defined.

It is the ability to persevere through tolerable suffering to achieve your goals. (UMR 69)

Pushing through extreme pain and adversity, and doing anything it takes to reach your goal. (UMR 308)

The final theme under Persistence/Perseverance is the theme of *No DNF*, which stands for "did not finish". Runners cited the importance of never "DNF-ing."

20 100-mile race starts, and 20 finishes. No DNF, a/k/a Did Not Finish. Very unusual ratio. For an accomplished runner to attempt this distance, the question is not "Can I"? The right question is "Will I"? (UMR 3)

Mental toughness comes down to two main areas: can you keep moving when something hurts – when it hits you how stupid it is to run for another 10 hours, do you have what it takes to understand that the pain of dnf is much worse than the pain of the next 10 hours? (UMR, 196)

Psychological skills, as a category in this study include strategies, methods, mindsets, or attitudes described as components of mental toughness in ultramarathon runners. Within this category, 14 themes emerged associated with various psychological and emotional contexts. The first and most frequent theme involved the ability to maintain or employ *emotional or mental control*. This was cited as a vital aspect in ultra running in a variety of scenarios.

Keeping an even keel, regardless of the circumstances. (UMR 182)

Mental toughness regarding Ultramarathon running is learning how to control where your thoughts and mind go. (UMR 259)

The next theme that emerged from defining mental toughness in ultramarathon running was *focus*. This encompassed the ability to focus on goals and concentrate on psychological/emotional aspects. Focus as a component of mental toughness also involved paying attention to logistics such as nutrition, hydration, terrain, and trail markings.

The ability to maintain mental focus on your running goals while enduring discomfort. (UMR 390)

The ability to focus on the task at hand and not allow your thoughts to distract you. (UMR 2)

Ability to completely focus on running, hydration, and nutrition. (UMR 7)

Participants defined mental toughness as being able to properly identify “regular” pain versus injury pain, and tune into their body to address needs related to ultra running performance. These attributes were grouped under the theme of *running smart*.

Mental toughness is pushing one's physical potential to its utmost, and not beyond. It's easier to run hard and get injured than it is to run just hard enough to

avoid injury, and thus keep adding miles and entering distance events. The brain needs to work in partnership with the body. (UMR 215)

A degree of intelligence/acute to realize how much to NOT push it, so the toughness to exercise some restraint as well. (UMR 321)

Mental toughness in ultras, for me, starts with tuning into my body. Constantly monitoring what it needs. Backing off whenever the pace borders on unsustainable. Thinking about how to stay happy and healthy to the next aid station, and letting the miles pass without getting anxious or pushing myself beyond my limits. I certainly have a tenacity, or ability to adjust to present circumstances on the trail. (UMR 118)

Pursuit of a goal, or utilization of goal setting was another theme identified by participants as a means of achieving mental toughness, describing what a mentally tough runner does, or an aspect of mental toughness. This theme was described separately from persisting to and persevering toward a goal from the previous category because the main action here is setting or achieving a goal, rather than the journey of not allowing anything to prevent attainment of that goal.

I think it is dedication to stick to one's goals. (UMR 138)
 Reassessing the situation and setting a new set of goals without accepting defeat, such as just finishing or staying in top 5 or 10 when the podium evades, etc. (UMR 82)

Definitions of mental toughness included themes of *confidence and belief in self/ones capabilities*. This also included references to self-efficacy.

It's the ability to KNOW that you can when you think you can't. (UMR 237)
 The ability of an individuals' will or spirit to convince their rational mind that obstacles and impediments that may on first appearance be beyond their ability to overcome are, in fact within their ability to overcome. (UMR 346)

Participants mentioned the importance of *self-talk or utilizing mantras* as an aspect of being a mentally tough ultramarathon runner.

You continually tell yourself this is what I came here today to do and you just do it. There are many internal dialogues going on in your head! (UMR 87)

Not stopping, even when inside voices say, this is stupid, why do you do this, you won't make it, you're slow, this is taking too long, why don't you just enjoy your life. Telling those inner voices to quiet. Using mantras effectively, like, hills are my friend, I can do it and I will do it, I am strong, light, free (UMR 286)

A more attitude or disposition-based theme that arose in the data was *positive outlook and attitude* as an important component of mental toughness in ultramarathon running.

The ability to roll with the changes and keep a positive attitude. (UMR 374)

More generally, mental toughness is about finding the positive framings that will keep the experience enjoyable in spite of the factual elements that could be easily interpreted as misery. (UMR 29)

Mental toughness was defined as including the theme: *to block out distractions, keep the mind occupied, or dissociate* during a race or training run. This can include blocking out physical pain, mental fatigue, or otherwise keeping the mind engaged through these ultra duration events.

Mental toughness is the ability to disconnect my mind from what my body is telling me. (UMR 230)

My mental toughness comes from my ability to block out negative thoughts through distraction. Running for hours on end is immensely physically stressful, and if I start thinking about how it hurts (outside of acute pain that needs immediate attention), I'm likely to give up. So I focus on my breathing or heart rate, or look around at the scenery, or start doing math in my head to figure out how far it is to the next aid station, or how soon I need to take in more calories, or what kind of overall pace I'm on. (UMR 275)

Participants found the idea of being *present, or having diligent presence* as an important theme of mental toughness in ultramarathon running.

It's a bit like trying to tune into the effort on a different level – look around, take in the sights, sounds, and smells of the environment and forget the mechanical business of running. (UMR 47)

Staying in the moment and solving whatever challenge is before you. (UMR 420)

While similar to the previous theme, *awareness and perspective* were distinct in focusing on a more philosophical approach of defining what mental toughness is through the lens of an ultra runner.

Incredible self-awareness, body awareness, ego-less.... I am detached but highly aware. In each independent moment, you have an awareness and ability to make a choice or adjustment. (UMR 323)

The ability to back out of the moment and see the larger picture, including the mental and physical cycles through which I will travel while running, and the fact that my current feeling is just one spot in a cycle. Thus, if it hurts, it will get better. If it feels good, remember this, because it will hurt soon enough. And at the end I will wish I could be back at the beginning. (UMR 349)

One of the smaller themes that were important to note within the definitions of mental toughness was *drive or motivation*.

Having the drive to see out the challenge - regardless. (UMR 98)

Mental toughness is extremely important for motivating the training (getting out there) and suffering on race day. (UMR 174)

Even though it was only mentioned twice in all of the definitions, the theme of *patience* can supplement the time and duration factor mentioned in external factors in the third main category of themes. The theme of patience in regards to mental toughness can be a unique aspect to ultra running.

Races of all distances require mental toughness. For me, the mile run on a track can require more toughness (willingness to maintain or increase the level of physical exertion in the face of acute pain) than an ultra race. The difference

in an ultra is that more patience is required and of course the pain, while not quite as intense, is experienced over a longer time period. (UMR 317).

Another infrequent, yet important, theme was that of *relaxation*, or mentioning of a sense of calm as a psychological skill that could be important to mentally tough ultra runners.

Able to relax and work towards accomplishing the task, without too much stress, when presented with a challenge. (UMR 23)

The final theme under psychological skills in defining mental toughness in ultramarathon running is attainment of *flow*.

Finding the "flow". It feels effortless and soothing. You embrace the pain as part of and an enhancement of the experience. You keep the perspective that you are lucky to be able to complete this event and many others are not so under no circumstances do you let yourself feel miserable or that you want it to be over. You acknowledge any perceived discomfort and know it will pass and most of it is in the mind. I could go on and on...(UMR 83).

External, Environmental, and Preparation factors were grouped into a central category to encompass: physical training and mental conditioning, adverse/unique trail or event conditions, and social aspects including both support and competition.

The first theme under the category of preparation is having the *discipline to do the conditioning and training* necessary for the sport. Runners stated that mental toughness meant putting in the time on conditioning to be ready on race day.

Training in every kind of element thrown at me. (UMR 307)

To me mental toughness is both the ability to get up every morning and train and the attitude of never quitting. (UMR 439)

Specific to ultra endurance sport, *time and duration* of physical activity is a highly relevant theme. Many definitions of mental toughness in ultra running touched on the

ability to remain determined and utilize psychological skills for extremely long durations of time.

Mental toughness boils down to the ability to deal with the length of the race. (UMR 195)

Mental toughness in Ultra is really determined in 100 mile or 24 (hour) events. Daylight events do not tax the system and demand the same level of toughness that being alone at night requires. (UMR 206)

Most ultra races involve a significant amount of trail running, mountainous terrain, water crossings, wildlife, unexpected weather conditions, rapid temperature changes, and difficult to navigate routes. Another consideration is that the races are over many miles and with few participants; much of racing (and especially training) is done alone. *Conquering adverse conditions of the course* was cited as a theme in defining mental toughness in ultra running.

Mental toughness - not letting anything break you down, whether it's an environmental factor, or internal factor. Things like rain, snow, wind, fog, water crossings, rocky terrain, mountain lion sightings, (or mountain sightings...haha) are examples of environmental factors that help to exercise mental toughness! (UMR 193)

The ability to keep going when you are alone on the trails. (UMR 376)

In addition to physical training, *mental preparation* was a theme in defining mental toughness; this included utilizing psychological skills or mental training prior to an ultra race/event.

Mental preparedness is a term I use, where in preparing for a race you go through in your mind how difficult the run will be and how bad you may feel and to remind yourself that it will pass. I do this on my training runs, or sitting in my car or anywhere, just going over in my head how I will overcome any obstacle in the race. (UMR 191)

My ability to ensure that my mental toughness is as prepared, or more prepared than my physical fitness to achieve any/all goals I plan for myself. Training my mind, my thoughts, and my actions to understand that I will accomplish the task at hand. (UMR 274)

Unlike many other sports, the comparison/competition factor is not quite as strong due to the nature of ultra running. However, in reference to mental toughness, ultra runners cited *competition or passing an opponent, and/or social support* as a theme in defining this construct.

I surround myself with ultra runners who harbor views regarding distance and provide me with new perspective. (UMR 122)

It enables you to catch – and pass – another competitor when your body wants to “just let him go.” (UMR 226)

Similar to the concept of running smart in the psychological skills category, mental toughness in ultra running also includes the theme of smart preparation and *logistical planning*; based on participant responses, being mentally tough means going in ready for the race.

The ability to plan for, train for, and complete, an ultramarathon; each segment brings about different levels of mental toughness. The planning and training should prepare one's mental toughness. Without the planning and training, most do not have the mental toughness to complete the race. (UMR 401)

Thinking about every potential obstacle to being successful (i.e., completing the event), and then developing a plan for dealing with each obstacle should it arise. (UMR 451)

The final theme under the environmental and external factors category includes the ability to complete *loop races*, which is another aspect that is unique to ultra running. Mental toughness can be defined as being able to endure ultra distances in loops ranging

from a quarter mile track (in charity events, 24/48 hour challenges), up to 20-mile loops.

This can be mentally taxing to pass the finish line over and over again.

This is especially true in races where it would be easy to quit due to the circumstances such as a looped course where you pass a logical stopping point many times. A local event is on a one mile loop and is run for a specified length of time (9hrs 11min) it is very easy to stop during that event. (UMR 240)

The last category, entitled **Other**, included relevant themes that did not fit into the three aforementioned categories. These themes were items that came up repeatedly and were important to note as aspects in defining mental toughness in ultramarathon running.

The first theme under the Other category, was that a component of mental toughness is the ability to achieve what was *perceived as impossible*, or a goal or distance that was *previously considered unattainable*.

Mental toughness is the ability to put logic and reason aside to finish something that, at times, appears to be impossible. (UMR 241)

Knowing that nothing is impossible if you really believe and strive to make it happen. (UMR 343)

One of the most interesting themes that emerged was that a few runners stated they *did not know what mental toughness was, did not think they had it, or stated that it did not play a large role in ultramarathon running*.

I don't feel as though I rely on mental toughness to get through an ultramarathon. I enjoy getting out and pushing through for the fun of it. I like feeling tired and the feeling of having accomplished something most people don't even want to try. (UMR 116)

Regarding mental toughness and ultramarathons, personally, an ultra is not the toughest thing I've ever done. (UMR 318)

On the contrary, some participants cited that mental toughness in ultra running

was simply a *requirement* or absolutely necessary.

Mental toughness is not an option in ultra running, you have to have it no matter what. (UMR 214)

The final theme under the **other** category was references to defining mental toughness in ultras as similar to mental toughness in life. This was defined as mental toughness in life allowing one to be a mentally tough runner, or the mental toughness aspect of ultra running allowing a participant to be tough in life as well.

I personally have found through ultras that I am a “mentally tough” individual and it has given me great confidence in other areas of my life. At times when things seem really hard I can think of a moment in a race when all things were going bad but I was able to keep moving forward. (UMR 454)

Qualitative analysis of the themes afforded the emergence of a definition of mental toughness in ultramarathon running. It was vital to include the themes which received the most support: persistence, pushing through perceived physical and psychological limitations, enduring pain or extreme fatigue, utilizing psychological skills, pursuing a goal, running smart, having focus, a strong physical background, and enduring a multitude of factors for a long duration of time.

The initial definition lacked the comprehensiveness gained from coding all 476 definitions. The new and refined definition emerged to address the most prominent themes; supplements were added that included what mental toughness allows an ultramarathon runner to do. The final definition was:

Mental toughness in ultramarathon running is the ability to persist and utilize mental skills to overcome perceived physical, psychological, emotional, and environmental obstacles, in relentless pursuit of a goal.

a. Mental toughness in ultra running also allows a runner to overcome perceived

physical and mental fatigue, especially in the most challenging parts of training and competition.

b. Mental toughness involves maintaining emotional control and self-talk to combat negative thinking and remain positive, to focus on association/dissociation as needed, and run smart to tune into the body to prevent injury and address physical needs.

To examine which traits are most important from the Jones and colleagues (2007) traits of mental toughness from the quantitative phase, the definitions of mental toughness also provide attributes of the mentally tough ultra runner. Traits were grouped into two categories: (1) What mental toughness allows an ultra runner to do and (2) Attributes of the mentally tough ultra runner. This distinction has been absent in prior mental toughness literature (Crust, 2008). Table 10 shows the selection of traits into individual categories.

Mental toughness allows an ultra runner to:	Traits of mentally tough ultra runners:
Exceed perceived physical limitations/fatigue	Persistence
Exceed perceived mental limitations	Determination
Overcome environmental obstacles	Emotional control
Keep going/move forward relentlessly	Focus/concentration
Persevere through challenging moments	Body/pain awareness
Never quit	Goal-orientation
Finish	Confidence
Pursue goals	Positive attitude
Run smart	Perspective
Keep their mind occupied/focused	Drive/motivation
Talk positively to themselves	Patience
Put in physical conditioning	Discipline for training
Be mentally prepared	Adaptability
Achieve something perceived as impossible	
Endure the time factor	
Achieve the impossible	

Semi-Structured Interview Results

The third phase of this thesis was designed to utilize semi-structured interviews to gain a more thorough understanding of the role of mental toughness in ultramarathon running. The following data address research questions on the most important traits of mentally tough ultra runners, experiences and examples of mental toughness, and how mental toughness is developed in ultra running.

The end of the online survey asked participants if they would be willing to be interviewed on their experiences and perceptions of mental toughness in ultramarathon running. Of the total participants who attempted to complete the online survey (804), 359 (45%) agreed to be contacted for a follow-up interview. From this, groups of 10-12 participants were randomly selected and emailed. In order to reach the ideal sample size of 12, 40 participants from the 359 were emailed; thus, the response rate was 30%. Three females and nine males were interviewed; two interviews were conducted in person, the remaining 10 were conducted over the phone. Ages ranged from 24 to 78, and ultra running experience was less than a year to over 30 years. Participants' pseudonym and basic demographic information are listed in Table 11.

The semi-structured follow-up interviews were conducted over a one-week period. All interviews were transcribed within three days of conducting the interview and then sent to the interviewee for reviews and corrections; four interviewees responded with minor corrections and additions. This encompassed a partial Delphi method. All transcribing and initial coding were performed by the interviewer. Using a grounded theory approach (Corbin & Strauss, 1990), an inductive-deductive process was used in the multi-faceted coding process.

TABLE 11: Demographic characteristic of 12 follow-up interviewees.

Pseudonym	Gender	Age	Education	Years		Participation
				Running	Running Ultras	
Allen	Male	58	Doctoral Degree	44	3.5	Recreational
Brittany	Female	34	Graduate Degree	21	8	Recreational
Charlie	Male	37	Doctoral Degree	14	8	Competitive
Denise	Female	31	Graduate Degree	8	2	Recreational
Evan	Male	51	Graduate Degree	2	11 mo.	Recreational
Frank	Male	46	Doctoral Degree	32	3	Recreational
George	Male	47	Some College	15	12	Very Competitive
Hank	Male	63	Graduate Degree	43	15	Competitive
Ian	Male	78	College Degree	36	33	Competitive
Jack	Male	39	Doctoral Degree	16.5	4.5	Competitive
Kelly	Female	44	College Degree	23	3	Very Recreational
Landon	Male	24	Graduate Degree	6	5	Somewhere In Between

The first stage of analyzing the data involved development of a list of codes or themes after reading through each interview transcript. Similar to when the codes were established in defining mental toughness, a knowledgeable colleague verified that the developed codes of the semi-structured interviews were an accurate representation of the data, additional coding was also verified through a doctoral-level sport psychology colleague. Themes in this phase were similar to themes in phase two, the 476 definitions of mental toughness, emerged and were grouped by conceptual similarities. Responses to the questions were also grouped into five categories based on research questions and an additional category with added comments from the interviewees to supplement their responses to individual questions. Additional data not relevant to the research questions were collected in the interviews (see Appendix H) and transcribed to both gain a more comprehensive perspective of the ultramarathon running mindset, and provide a foundation for future studies. This beneficial data were not directly relevant to the current

study's research questions. Appendix D includes all of the questions asked of interviewees.

The results of this phase of the research project will focus on the following objectives, congruent with the research questions:

- a. Confirming and honing a definition of mental toughness in ultramarathon running.
- b. Identifying traits of mentally tough ultra runners.
- c. Providing examples of runners' own experiences with, and witnessing of, mental toughness in others during ultra events and training.
- d. Understanding how mental toughness was/can be developed in ultramarathon running.

Themes that emerged were similar to those found in the definitions of mental toughness, but with examples and experiences, a much more comprehensive approach yielded additional descriptive data. The data were broken into six categories based on the questions, Defining Mental Toughness, Traits of Mentally Tough Ultra Runners, Personal Experiences with Mental Toughness, Witnessing Mental Toughness, Development of Mental Toughness, and Additional Comments. Within these categories, based on interview questions, themes are represented with frequency of responses for each concept. See Table 12 for a visual representation of the coding process.

TABLE 12: Qualitative data derived from coding semi-structured interviews.

Themes	Categories
Keep going, pushing through (6)	Defining Mental Toughness
Agreement with initial definition (4)	
Allows you not to stop (3)	
Emotional factors (3)	
Based on perception (2)	
Pushing beyond where you think you can go (2)	
Physical toughness (1)	
Persistence, perseverance (4)	Traits of Mentally Tough Ultra Runners
Awareness/perspective (4)	
Deal with physical fatigue (3)	
Too crazy to know when to quit (2)	
Positive Self-talk (2)	
Goal-oriented (2)	
Commitment to finish (2)	
Obsessive (1)	
Calm (1)	
Stubborn (1)	
Preparation (1)	
Flexibility (1)	
Mental reserves (1)	
Ability to overcome adversity (1)	
Increased use of psychological skills (5)	Personal Experiences with Mental Toughness
Never quitting, keep going (5)	
Surpassing physical fatigue/pain (4)	
Adverse environmental/course conditions (4)	
Perspective (3)	
Belief in self (2)	
Think about tough life achievements (1)	
First time doing a distance (1)	
Overcoming injury/pain/adversity (6)	Witnessing Mental Toughness
Never quitting, finishing (5)	
Older runners (4)	
Fighting time cutoffs, running longer (3)	
Extreme environments (3)	
Top UMRs in the sport (1)	Developing Mental Toughness
Social aspects: camaraderie, stories, culture (7)	
Race/Training Experiences (4)	
Perspective, life experience (4)	

Heredity/upbringing (2)	
Pressure to perform (1)	
<hr/>	
Comparing ultras to life (2)	
Diversity in MT in UMR (1)	
Life experience (1)	
Running to cope (1)	
Perception (1)	Additional Thoughts
Psychological skills (1)	
Achieving previously thought impossible (1)	
Sense of adventure (1)	
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The first category, **Defining Mental Toughness**, was based on a question designed to build on or verify the raw definition of mental toughness that was established from coding a random selection of 100 of the total of 476 definitions of mental toughness from the online survey. Most frequently, interviewees supported the concept of *keep going*, or *pushing through*.

Kelly, a 44-year-old, female who described herself as competitive, elaborated on this point in her definition.

By far, the mental toughness comes first because the mental has to trump the physical issues during the race.... It's like there's something inside of you that just keeps you going and you're so determined to do what you set out to do that day.

The next theme under defining mental toughness is participant *agreement with the definition* of mental toughness. Jack, a 39-year-old ultra runner, felt that the definition was sufficient.

I think it is. I don't remember exactly what I put. I know that it had to do with both the physical and the mental struggles that happen, and certainly it is over a very long period time, or can be. That's definitely the added challenge, most of it.

Interviewees also emphasized the point that mental toughness allows one *not to stop*, quit, or give up. Landon, a 24-year-old ultra runner who has been completing ultras since he was 19, talked about this theme further.

Because basically you get into these things and all of your senses are screaming at you to stop, from your body, the rational bit of your mind. The whole reason for doing this is absolutely absurd. It's really pointless, and so everything is telling you to stop. Mental toughness, in this aspect, I would definitely say it allows you to not stop.

It was interesting that two ultra runners mentioned they agreed with the definition, especially the emotional part. The raw definition lacked mention of emotional toughness or overcoming emotional challenges, but participants may have inferred this from the reference to pushing beyond psychological limitations. It appeared important to include an emotional component in the definition, particularly after runners discussed experiences of intense emotion during ultra training or events. Brittany, a 34-year-old self-described recreational ultra runner, said:

I like that it encompasses the physical, mental and emotional aspects.

Some participants did not necessarily agree with the definition as is, given that some of components of the definition are based on perception. An “unconventionally long duration of time” can mean different things to different runners. Hank, a 63-year-old runner who has been running ultras for over a decade, brought this distinction to light.

...I'm not sure if I agree with what you say about an unconventional amount of time. Unconventional is really in the eye of the beholder... There are people who run 50ks and say, “man 50ks and I'm done, I'm never going to run a 50-miler, I'm never going to run a 100-miler.” Yet, other people ask “you're doing a 50k trail run?! Are you out of your mind?! How long does that take?”

Hank also provided a great example for the next theme, which involved *pushing beyond perceived limitations*.

I would say it's just the ability and awareness to push beyond where you believe you can go. And when you believe that you can't go any farther, to continue going.

The last theme under defining mental toughness was that an ultramarathon runner should also have *physical toughness*. Frank, a 46-year-old self-described recreational runner, talked about the importance of the physical foundation.

First of all, the person has to be physically tough in order to endure the mental demands of the sport. If one is not physically tough, if they're not well trained, then they're not going to be in a position to draw on their mental reserves late in the race.

The next category, **Traits of Mentally Tough Ultramarathon Runners**, was based on the question asking interviewees what traits stood out as important aspects of being a mentally tough ultra runner. The most prominent theme was *persistence and perseverance*. This was also a frequently cited theme in the 476 definitions of mental toughness. Allen, a 58-year-old ultra runner, talks about this theme, including *stubbornness, too crazy to know when to quit, and obsessive*.

I think, to me it is extreme persistence. Where you may have setbacks, and you're always going to have setbacks...you do whatever it takes to overcome the setbacks, and keep going.... stubborn as a mule. That is the same thing, just a different way of putting it. The ability to go beyond obstacles, to work around obstacles, to not give up, and persistence may just be the best word for that, or stubbornness, or just too crazy or stupid to know when to quit. It could be obsessive...and sometimes maybe ultra runners fall into that. But I think it's in a good way that it is what allows you to accomplish stuff as opposed to in a bad way. In a certain way it can be good too.

Another theme cited by interviewees as a trait of mental toughness was that of being able to cope with *physical fatigue*, or understanding perceived exertion. Charlie, a 37-year-old self-described competitive ultra runner, talked about this theme.

Perceived exertion is “how hard it feels.” During a typical 50 to 100 mile event, a runner’s perceived exertion increases exponentially as the race progresses. Thus, it feels like they have to work much harder to maintain the same pace. So much so that by the last 5 miles of a 100-mile race, just lifting a foot can take shear will of the whole mind/body. However, a mentally tough ultrarunner knows perceived exertion is not their body saying they are “red lining” their maximum power output (heart rate), but is simply an annoying discomfort. A mentally tough ultrarunner is able to cope with an unusually high perceived exertion.

Psychological skills were a recurring theme in almost every question. In regards to traits of mentally tough ultramarathon runners, interviewees cited the ability to talk to themselves, or utilize the theme of *positive self-talk*. Brittany, the 34-year-old recreational ultra runner talked about this as well as touched on the theme of *remaining calm*.

You’re out running and you twist an ankle and you have to keep going.... the mentally tough runner is someone who is going to be able to stay calm in a situation like that and have the positive self-talk. They tell themselves that “you’re not going to feel this horrible forever, you can keep going” they can stay calm, stay in the moment, and not panic.

Another theme mentioned by the interviewees was that a mentally tough ultramarathon runner needed to have the trait of *awareness* both physically and psychologically. Evan, a 51-year old runner, who is new to the sport of ultra running talked about being *self-aware, the importance of preparation, and being flexible*.

I think, self-awareness is really important, knowing your body, knowing yourself mentally. Being able to prepare for the event you’re going to undertake, physically but also mentally, and planning well. Being flexible is really important to me.

Interviewees also discussed the importance of being *goal-oriented*. Ian, a 78-year-old ultra runner who has been running ultras for 33 years, described goal-orientation and striving to accomplish goals.

I think that they're goal oriented, that they're very determined to achieve that goal and not let anything stop them. You don't look at the end of the race. You look at the segments in the race and achieve those until you get to the end.

Commitment to finish was another theme under traits of mentally tough ultramarathon runners. George, a 47-year-old ultra runner who described himself as very competitive, talked about the importance of this trait from personal experience.

I do the Leadville 100 a lot...It's a notorious race with a high dropout rate, it's usually a 40% finish rate so a lot of people ask me what it takes to finish. When you walk up to the start line, you say "I'm going to finish this event". And if you don't have that commitment, you don't have that trait within you to say I'm going to make the commitment and I'm going to do it, is really the difference between the people that finish and the people that don't.

One participant mentioned the idea of mental toughness meaning have the *mental reserves* to allow one to be successful in ultramarathon running. This was mentioned in a few answers to questions, but most prominently in the question on traits of the mentally tough ultra runner. Frank referred to the mental reserve and also how this mental reserve component of mental toughness contributes to the *ability to overcome adversity*.

.... a reserve that "normal" people don't have, when under tremendous stress. I think the main thing is to have that mental reserve, that place that they can go, where they can draw upon an inner reserve of strength, that allows them to withstand adversity that other people, that people that don't do ultramarathons do not have.

Interviewees were asked about their personal experiences in which they felt particularly mentally tough, whether it was in training or competition. Some personal **Experiences with Mental Toughness** yielded examples of recurring themes, such as

utilizing psychological skills, overcoming environmental and fatigue-related challenges, having perspective, and not quitting. Additional themes include believing in oneself and one's running capabilities, comparing mental toughness in ultramarathon running to other life experiences, the first time conquering a particular distance, training, and challenging oneself.

The first, and most prominent theme in participants talking about individual experiences of mental toughness in their ultra running was *increased use of psychological skills*. Some skills mentioned were self-talk, turning off self-doubt, focus, and dissociation. Evan, the 51-year-old, male, novice ultra runner talked more about how he has used dissociation more and more to cope with certain aspects of the ultramarathon.

I've done about nine ultramarathons now, maybe ten. Every one of them, there always comes at least one point where, you just feel terrible.... What I've been finding more and more that I am able to just, sort of, almost, put that aside, or dissociate my mind from my body. At least the part of my mind that sense pain and just say, okay, that's there and I know that's going to be there for a while

Another theme in the personal experiences of mental toughness was the concept of *never quitting*. The most powerful example of this was highlighted when Kelly, the 34-year-old competitive ultramarathon runner talked about a 50-miler she had done where she actually got lost and was struggling to make the time cutoff.

One of the things that I've been trying to do is to qualify for a longer run and I need to do a 50 miler in under 11 hours, and the first one I did, I didn't make that goal. I actually got lost on the course, and I had redone the course and so the cutoffs were different at different aid stations, and apparently I didn't make a cutoff with about 6 miles to go and I was told to quit. I don't know where it came from but I just said, I'm not quitting. You can take my number; I'm just going to keep going. I came out here to do 50 miles, I'm doing 50 miles and it was dark, found myself on a bike path. I kept going and I made it, I came in last place, so I went back to my hotel and I thought, I don't know where that came from, I was just so determined and strong even after being out there for 10, 11 hours.

The concept of finishing based on completing the distance versus completing the distance in under the time cutoff will be explored more thoroughly in the discussion section.

Kelly also provided a great example for the theme of *pushing through physical fatigue or pain*.

Well I think the first one that I did was mentally grueling because I was physically in pain, and I had to tell myself that I was going to keep going on. I was not just in pain for a mile; it was 14 miles, which took me hours to do. When you're in that sort of pain, I don't know... It's weird you don't think about, okay, how is it going to feel afterwards? You just, you overcome your physical limitations and just get it done and keep on going.

Ultrarunning is unique also in the unpredictability and variability in the course. Some courses are hillier than others, markers may not be clear indicators and runners can easily go off course, and there is also the elements and weather to take into account. In experiences with mental toughness, runners talked about these *adverse environmental and course-related conditions and challenges*. Evan, the 51-year-old ultra runner talked about the Mountain Masochist 50-miler and why this race is particularly both mentally and physically challenging.

.... no one really knows how far the race really is. It's advertised as a 50-miler, but it's thought to be as long as 54 miles. For some reason the race director likes to toy with people and never really publishes the accurate distances between the aid stations.... This again, mentally, being able to say, okay whatever it has to be up here somewhere so I'll just keep going.

Perspective was a theme referenced by ultra runners in experiences with mental toughness. Interviewees talk about feeling different levels of mental toughness depending on different parts of the race. One ultramarathon runner, Denise, a 31-year-old female,

talked about feeling much tougher after the event than during the event. She also discussed the next theme, of *belief in oneself*.

It's all about perspective, because at the time when I was doing the ultramarathon, or doing the training, I didn't feel tough, I felt incredibly weak.... So while I didn't feel mentally tough at all *during* the race (although I definitely faked it by smiling and telling people that I was feeling fine), I knew that I actually was, in the end.... even though I didn't feel that tough during the race at all, looking back I knew that I had gained more mental toughness that day. Knowing that I was capable of going through all that mental and physical discomfort for an extended period of time in order to finish my goal gave me confidence for my next race.

The next theme, *thinking about tough life achievements*, will be explored further in the discussion section, as throughout this project, participants mentioned the link between mental toughness in ultra running to being tough in other aspects of their life. Frank talked about overcoming other obstacles, and how that contributed to his mental toughness in his first 100-mile race.

I was undertrained. I had not really done any particular mental toughness training to prepare myself for the toughest part of the race, which was about mile 80. I was done. I just thought about this stress that I had experienced in my life previously... other stresses in my life that I had conquered. I thought, hey if I can conquer those stresses, those obstacles, then I can make it to the finish line of this race, despite being cold, hungry, extremely sleep-deprived, very, very irritable and cranky.

One runner talked about feeling particularly mentally tough when *completing any distance for the first time*.

I think it's the first time I do any distance.... My first ultramarathon was a 24-hour race. My longest training run had been...in the 8 to 10 hour range...So, the first 9 or 10 hours wasn't bad. The training got me through the day and I thought about it afterward. It was sheer stubbornness that got me through the night. And, I wasn't moving very fast, but I did just keep going and had blisters like I never had before or since.

The fourth category, **Witnessing Mental Toughness**, came from responses from ultra runners when asked what mental toughness looks like in others. The first and most frequent theme involved seeing other ultra runners *cope with injury or interpretations of pain*. Charlie, a 37-year-old competitive ultramarathon runner talked about seeing runners overcome huge physical challenges.

I've seen people actually have serious physical injuries start and finish races. Injuries so bad that if they had them before they started the race, a non-mentally tough person wouldn't even start the race. Like massively sprained ankles, or strained ligaments, dislocated hips, torn knees....I've seen those runners continue and finish, and do well, even with those kinds of injuries.

Another participant, Denise, who has been running ultras for two years, witnessed toughness in a woman at the front of the pack.

For example, while watching the women's leader – I knew that she was in pain, but I could kind of tell that she was reveling in it.

The next theme under *witnessing mental toughness* involved seeing runners do whatever it took to *finish*, and *never quit*. Frank, the 46-year-old ultramarathon runner talked about seeing mental toughness when crewing for another runner.

Probably the “episode” that has left greatest mark on me is when I crewed one of my best friends at Badwater. I would say there was probably about six times when I thought he was going to DNF. I thought he was going to quit and he unbelievably just pulled himself out of the chair so many times, and just got right back up. As a result, he somehow was able to keep pushing himself time after time after time until he was finally able to make it to the finish line.

Another frequent theme in the question of what mental toughness looks like in someone else was that of *older runners*. Interviewees talked about runners much older than them, and seeing them successfully complete ultras. Brittany, the 34-year-old self-described recreational ultra runner, elaborated more on this in her answer.

I always suspect that the older runners I see finishing ultras must have a lot of mental toughness....they are overcoming not just physical and emotional challenges they may have on that particular day. But our society has such a bias against older people, especially older athletes. Yet, these runners are 50, 60, 70, and even 80 years old, and are finishing ultras....they not only have to be mentally tough to keep themselves going. They also kind of need to be defending themselves against a lot of those jokes or put-downs from their peers or that society might put in their way.

The next theme that arose in witnessing mental toughness was seeing individuals *fighting to make the cutoffs*. In addition to the added pressure of being considered an official finisher, this also means the runner has been *running significantly longer*, enduring the elements, and fatigue, much longer than their fellow competitors. Landon, the 24-year-old male ultrarunner, highlights this point.

While the performances at the front of the pack are pretty spectacular, I think the ones that are most touching and definitely show that grit factor, or the mental toughness factor, are the people that are chasing cutoffs all day. You know they've been on their feet, hours and hours longer than you have. In some instances, 24 hours longer than the winners. Just go to a finish line of a 100-miler and right at the cut off time is approaching and watch people come in. Even if there is money, there not in it for that, they're not going to win anything at that point, and they can barely walk, and they've been out there longer than anyone. They still have that whatever inside of them to say, "hey yeah I'm going to finish this freaking race." I've even seen people come in the finish line, say it closes at 36 hours, and people come in at 37 hours, they just keep walking, the race is done, they aren't going to be an official finisher, but they're going to get to the finish line anyway.

Another theme in seeing an individual exhibit mental toughness is when the ultramarathon runner is able to overcome extreme environmental conditions. This could be in a race that is typically grueling, such as the Badwater Ultra across Death Valley in August, or ultras across Alaska in the winter. Hank, the 63-year-old runner who has been

running ultras for 15 years talked about being mentally tough through battling extreme conditions.

I see it all the time.... It's 98 degrees out and people are dehydrated and they just continue to run. Whereas, most human beings would say, "it's too hot, you'll kill yourself out there." But it's something that they want to do to challenge themselves. Whether it's running through heat that other people find just unbelievably unbearable, or whether it's running in the absolutely freezing cold, where you're in danger of frostbite, it's just continuing on and moving.

While runners witness mental toughness in those fighting the cutoffs, another interviewee talked about the mental toughness in the ultra runners at the front of the pack, or those runners breaking course records.

At a 48-hour race I entered, Phil McCarthy did a 48-hour record...last spring...he did 257 miles, so he was just zipping on by and zipping on by. That's probably a different kind of mental toughness, he was much faster, but he was pushing to his extreme the whole 48 hours to set an American record in that. It just sort of hit me afterwards, and the other thing is I got a picture with him afterwards, he had just set an American record, he had run 11 minute miles continuously for 48 hours, and he was gracious enough to stand there next to me while someone took a picture of us. I just think that's... not many sports people would do that.

Of the 12 participants interviewed, the most consistency existed among *social aspects* of ultramarathon running. These included themes of *ultra culture*, *camaraderie*, competition, or influential *ultra running friends* as a source of developing mental toughness. Evan, a 51-year-old runner who's been doing ultras for less than a year, mentioned the importance of having fun, just going hard and enjoying himself, and meeting people, including the top finishers of the ultra world. This was part of his response about what has developed his mental toughness in ultramarathon running.

I continue to go as hard as I've been going but also try to enjoy myself, and meet people during races. I've fallen behind someone and we start running together at mile 30 on a 50-miler, and just strike up a conversation. You do run a lot by

yourself and that's fine and all, because you always know when a race comes up that it's kind of like a party. (laughs) Even among the really fast people, you don't even get near the fastest runners in road races, but you may get the chance to chat with one of the front-runners doing an ultra, easily.

Another theme of developing mental toughness cited by interviewees was remembering and drawing from both positive and negative experiences, in training and competition. Brittany, the 34-year-old who has been running ultras for eight years, talked about learning from a very emotional long run in training for a 100-mile race.

I would say that, it gets built through not only having really good days, but also having really bad days, and seeing that you can push through it....I decided that I needed to have the experience of starting in the dark, running all day long, and finishing after dark as well, so that I had the chance to experience that mental fatigue, as well as the physical fatigue before race day. And it was the weirdest run I've ever had. The worst part of it, the weirdest part of it, was that, after the sun set, and I had been running for a good 10-12 hours. I was following a friend of mine who agreed to pace me for the final ten miles of this epic run. I got really disoriented, and this is a trail I had done a million times before, but she was saying we were in one place and the parking lot was this way and she was like "no, no, Ashley, it's over here, just keep going". It was just bizarre, and I got very emotional. I was ready to burst into tears because I was so confused, and tired, I hadn't slept that well the night before, and that day I felt really awful, and thought to myself: oh my god, that was only 70 miles, how am I going to run 100? But, looking back on it, I see that as a really valuable experience and after that run, recognizing how weird I had felt, I was able to tell myself that "you've been through that and you felt really weird, in all these different ways, how can you go about using that experience to prepare for your 100 miler?" It's through training experience like that, that you are able to look back, and you don't necessarily feel great at the time but you are able to look back on that and say, "well, I pushed through that and so I can push through this too".

Development of mental toughness in ultramarathon running was also characterized by the theme of having *perspective or the life experiences* necessary to have the mental toughness foundation to be a successful in ultramarathons. Frank, the 46-

year-old male self-described recreational ultra runner, talked about being at a point in which he has the experience and stability to allow him to be mentally tough.

It's not just one thing. I think I'm at a point in my life that led me to being a successful ultramarathoner. That is that, I'm older now, and I've got pretty much everything I want. If I had other stressors in my life, if I was struggling financially, I think it would be a lot more difficult for me to attack this sport, because it is so amazingly demanding.

Interviewees mentioned that their mental toughness was developed from an early age, or attributed to their *upbringing or hereditary factors*. George, a 47-year-old ultramarathon runner who has been running ultras for over a decade, talks about how where he lived and how his environment developed his mental toughness.

It certainly was my childhood, both how I grew up and what I did physically in the environment I lived in. I grew up in a really, really, remote part of Utah, in a small community of a couple hundred people. Everything we did was difficult. I mean, getting groceries was difficult; going to school was difficult; what we did for fun was difficult; playtime was difficult. I think my family and their mental toughness, we're just people who if we say we're going to do something, we're going to do it.

The last theme under developing mental toughness was that of feeling the *pressure to perform, or be successful*. This motivating factor was cited by Denise, the 31-year-old female who talks about how important it is to finish and, if not, have that decision made by someone else, such that she never had to make the choice to give up.

I know that people are expecting me to do well or at least, finish the race. I don't want to go back home and have people ask me why I didn't finish, knowing that any answer I provide, while it may be perfectly legitimate (I was about to pass out/my ankle was about the size of Kansas), still meant that I, personally, decided to quit. I would rather have someone make that decision for me – as in, I blacked out and someone had to carry me out in a stretcher/my leg was in multiple pieces.

The final category of **Additional Thoughts** on mental toughness was designed such that interviewees could elaborate on any previously made points or discuss any aspects of mental toughness that were not covered in the questions. The additions were widely dispersed, but some themes emerged. The first theme was that of *comparing mental toughness in ultramarathon running to mental toughness in life*. Hank, the 63-year-old ultramarathon runner, talked about this concept.

Not just mental toughness in ultra running, but mental toughness in total. It's about developing a view of life and an attitude, a lot of the thoughts or a lot of the analogies that can be gained from ultra running and going extreme distance and doing anything, are parallels that have applicability across a persons life.... you're talking about self-control, self-actualization....there's a lot of lessons that can be gleaned from ultramarathon running as a platform.

The second theme from the additional thoughts category was that of *diversity of mental toughness* in ultramarathon running. This means that mental toughness is not just recognized in the elite, front-of-the-pack, but potentially in all ultramarathon runners. The discussion section will touch further on both the benefits and the dangers of assuming all of those able to complete ultramarathons are mentally tough. Brittany, the 34-year-old female ultramarathon runner, talked about this in the context of the study.

I liked that you were interested in talking to runners of every part of the pack, even though I'm a slow runner, I do think of myself as a really mentally tough runner. I've seen people who are a lot faster than I am, and much stronger physically. They sign up for like a dozen races, and they're only about to finish like 2 or 3. They just can't cope with something not going their way; they just fall apart if anything goes wrong. So I think it's cool that you recognize there are mentally tough runners in every speed, age, however you might think of it.

The next two themes, of *life experience and running as a coping mechanism*, were explained comprehensively by Charlie, the 37-year-old, self-described competitive, ultramarathon runner.

It's no coincidence that over 80% of all ultrarunners every year are between the ages of 30 and 60. It's definitely not a young person sport. So that just comes with getting more experience. In life too, not just experience in running, but experience in life. I think most ultra runners are a bit type A, certainly a lot of them have their issues, like serious issues with something going on in their life that they really need this, they need to do ultras. Ultrarunning is their way to help with that, and also channel all of that energy, whether that's anxiety, or whatever their feelings are about all that stuff, it's a great way to fuel an ultrarunner.

One interviewee wanted to reemphasize the idea of *perception*, which was a theme in earlier questions. Denise, the 31-year-old runner who has been running ultras for two years, talked about how mental toughness is really based on personal perception.

Mental toughness is based on personal perception. Everyone has different abilities and different experiences. If you manage to persevere through something that you personally find difficult, then you are exhibiting mental toughness.

Another addition from one participant included the theme of utilizing *psychological skills*, such as self-talk, and mental preparation. George, the 47-year-old, self-described very competitive ultramarathon runner, emphasized this point:

And I think that's why those events with low finish rates, the hard races, are the way they are, because people don't prepare for that part of it. They do all the other training, but they forget that you have to train your brain what to say, when it wants quit.

Kelly, the 44-year-old, female ultramarathon runner, added two themes: that of achieving something that was *previously thought of as impossible*, and *the sense of adventure*. She talked about how this shaped her attitude in the sport:

I'm doing something that I thought was impossible and now its possible. Part of an attitude is you know; don't tell me I can't do it. I feel like this mom with two little kids and I can get up and run 50 miles then anyone can do it, so that perseverance and determination that goes into that, it's just so fascinating that I can do that. Now I don't have to be fast, but I can actually do it, and I never thought I'd be able to do that. That's part of being mentally tough, is doing something that maybe people think that you can't do or tell you its crazy or why

are you doing that and you just do it. The joy you get out of it, the positive stuff, trumps all the other stuff. There's also a sense of adventure that plays into it to.

DISCUSSION OF RESEARCH QUESTIONS

The literature on mental toughness has displayed a limited scope through overemphasis on elite athletes, team-sport participants, high competition/comparison environments, and utilization of small sample sizes with little diversity. Additionally, research on ultramarathon runners has been limited to psychosocial constructs and physiological aspects. The present study sought to further the understanding of mental toughness in ultramarathon running. This objective was pursued through the following research questions:

1. How applicable is Jones and colleagues' (2007) definition of mental toughness in ultramarathon running populations?
2. How would a large sample of ultramarathon runners interpret and define mental toughness?
3. What are the most important traits of mental toughness in ultramarathon running?
4. What are some experiences and examples of mental toughness in ultramarathon runners?
5. Can mental toughness be developed and/or maintained in ultramarathon runners? If so, how does this happen?

Data collected from the online survey of Jones and colleagues' (2007) characteristics of mental toughness answer the first research question. The online survey also incorporated a question asking participants to define mental toughness in

ultramarathon running. This provided a wealth of data to establish a definition and what mental toughness may allow an ultramarathon runner to do. The 476 definitions of mental toughness also provided information on what traits are important in regards to mental toughness in ultra running. Semi-structured interviews were then conducted to critically examine the established raw definition of mental toughness in ultramarathon running, identify traits of mentally tough runners, provide examples of what mental toughness is and looks likes in ultrarunning, and lastly, to understand if and how mental toughness can be developed. Table 13 is a visual representation of this multifaceted study and how each research question was addressed.

TABLE 13: Thesis Phases and Research Questions

Phase of Study	Research Question
Online Survey: Existing Characteristics of Mental Toughness (Quantitative) (N = 408)	(1) Examine existing characteristics of mental toughness
Online Survey: Defining Mental Toughness (Qualitative) (N = 476)	(2) Defining Mental Toughness (3) Traits of Mentally Tough Ultra Runners
Semi-Structured Interviews (Qualitative) (N = 12)	(2) Defining Mental Toughness (3) Traits of Mentally Tough Runners (4) Experiences with Mental Toughness (4) Witnessing Mental Toughness (5) Developing Mental Toughness

Discussion of Phase 1: Online Survey of Jones and colleagues' (2007) characteristics of mental toughness.

Jones and colleagues' (2002) examined characteristics of mentally tough elite performers, and subsequently established one of the most cited definitions of mental toughness (Bull et al., 2005; Jones et al., 2007; Thelwell et al., 2005). This original definition emphasized that mental toughness was *a natural or developed construct that enabled mentally tough performers to cope with the demands of training and competing better than their opponents. Specifically, these athletes were more consistent and superior at remaining determined, focused, confident, and in control under pressure.* The researchers also originally established 12 attributes, and followed up to contribute 18 more, for a total of 30 attributes in a later study (Jones et al., 2002, 2007). While additional studies supported this definition and list of attributes, there are a number of limitations when applying this definition of the construct to other sports. In the ultra endurance community, the comparison to opponents is not as apparent. The pressure to perform can be viewed more intrinsically than extrinsically.

In the online survey, participants were asked to what extent they agreed with the characteristics of mental toughness as described by Jones and colleagues (2007), in the context of or in their experiences in ultramarathon running. In previous mental toughness research, qualitative methodology was utilized (Bull et al., 2005; Gucciardi et al., 2008; Jones et al., 2002, 2007; Middleton et al., 2004; Thelwell et al., 2005) or established measures of mental toughness (Crust & Azadi, 2010; Crust & Swann, 2010; Golby, Sheard, & van Wersch, 2007; Gucciardi, 2012; Nicholls et al., 2009) such as the Psychological Performance Inventory (Loehr, 1986), or The Mental Toughness

Questionnaire 48 (Clough et al., 2002) were tested for psychometric support or with new samples (Crust, 2008; Gucciardi, 2012). Until the present study, no literature has been produced which tested attributes of mental toughness with a population that had never been examined in this context.

Before discussion on the findings of the survey, it would be pertinent to attain a comprehensive scope of the sample through examining the demographic survey findings. Additional inferences are discussed below in relation to how these demographics (due to large sample size), could be an adequate representation of the larger ultramarathon running community. Males constituted 68.6% (N = 321) of the sample, and females represented 31.2% (N = 146). Lower female participation could be attributed to the incredible time demand of the sport. With such a higher percentage of the sample working in professional environments, it is possible that women have additional demands of balancing both domestic and professional responsibilities (Krouse et al., 2011). This percentage could also represent average male to female ratio of overall running/ endurance sport participation. As a source of comparison, women accounted for 20.4% of participants in a study on the demographic characteristics of runners competing in the Western States Endurance Run (100 miles) and Vermont 100 Endurance Run (Hoffman & Fogard, 2012).

Additional demographic data to note is that the average age of participants in the study was approximately 42 years of age. The largest distribution of age was between 40 and 59 (N = 227). This can be attributed to what runners talked about in the semi-structured interviews about the importance of life experience, stability, and perspective contributing to their success in ultramarathon running.

Supporting prior research on ultramarathon runners, the largest percentage (32.1%) of participants had attained a graduate degree (N = 150). Additionally, 13.9% of the participants had attained a doctoral degree. Other literature has suggested that ultramarathoners are a well-educated population, with 84% of participants of an 80-km race holding white-collar or professional occupations (Hoffman & Fogard, 2012; Rauch et al., 1988). The factors of financial stability and ambition could contribute to this correlation. Thus, an ultramarathon runner would potentially have both the time (available vacation/self-determining schedule) and psychosocial factors (motivation, determination, goal-orientation) to devote to many hours of training, and afford the cost associated with competing in ultra events.

The sample included very little diversity among self-identified race/ethnicity, with 92.3% of participants identifying themselves as Caucasian/White. This information presents various questions: Is this a representative demographic of the ultramarathon running community? Does this also represent the endurance running community as a whole? United States Census data from 2010 show that 72.4% of Americans identify themselves as Caucasian/White. Demographic data profiles the traditional ultramarathon runner as male, Caucasian, well-educated, and falling somewhere in between recreational and competitive, this data were congruent with that found in additional demographic analysis of ultramarathon runners (Hoffman & Fogard, 2012).

The bell-curve distribution range of very competitive to very recreational ultramarathon runners' supports participation diversity within the sample. Most participants who took the online survey self-identified as being somewhere in between competitive and recreational (N = 178), with the next largest categories being competitive

(N = 120) and recreational (N = 115), and, lastly, the outliers were very recreational (N = 27), and very competitive (N = 26).

The demographic survey also asked participants running and ultra-related questions. Participants were asked to report the number of years/months they had been running, the number of years/months running ultras, and to list the number of ultras they had completed. In hindsight, the question asking to list the number of ultras could have phrased to be more exclusionary. While there were certainly runners who had completed only one 50-mile race (thus encompassing the study's inclusionary status), there were runners who had run dozens of ultras. Many runners listed paragraphs of all the races completed, others simply said "too many to list," or "see my website." It could have been sufficient to ask the runner to list up to their top five or top 10 ultra events, or simply write in the number of races (approximately) that had been completed, rather than being asked to list all of the events, miles, and dates. The running-specific demographic data were mainly utilized to provide perspective for the researcher prior to the semi-structured interviews.

Now that a scope has been established of the sample of ultramarathon runners, one can better understand and interpret the findings of each of the phases of the present study. In regards to the research question on applicability of Jones and colleagues' (2007) characteristics of mental toughness to ultra runners, overall ranking provided a holistic idea of which attributes runners agreed with most. Table 2 shows the following characteristics received a mean score closest to 5 (strongly agree): *The ability to use failure to drive themselves to further success* (M = 4.30), *When training becomes physically and mentally tough due to obstacles, they keep themselves going by reminding*

themselves of their goals and aspirations, and why they are putting themselves through this (M = 4.26), *The ability to recognize and rationalize failure and pick out the learning points to take forward* (M = 4.26), *Adapt to and cope with any change/distraction/threat under pressure* (M = 4.23), and *Are not fazed by making mistakes, and can come back from them* (M = 4.20). Of these top five, two of the four total characteristics of post-competition are mentioned, thus placing the importance of these attributes in ultramarathon running.

On the contrary, runners agreed the least with the following characteristics: *Belief that achievement of their running goals is the number one priority in their life.* (M = 2.37), *Thrive on opportunities to beat other people in training.* (M = 2.4), *An inner arrogance that makes them believe that they can achieve anything they set their mind to.* (M = 3.19), *Possess a killer instinct to capitalize on the moment when they know they can win.* (M = 3.24), and *Love the pressure of competition.* (M = 3.27). With three of the five bottom ranked characteristics including some aspect of competition, comparison to others, and winning, it is clear that these attributes are not as important in the ultramarathon community.

Further analysis on age and the characteristics of mental toughness showed only negative statistically significant correlations for some attributes. Thus, older participants agreed less with the characteristics listed in Table 3. The characteristics include self-belief of overcoming any obstacle, utilizing a very difficult training environment as an advantage, and loving the aspects of training that hurt. Thus, as age increases, runners may feel slightly lower self-efficacy and do not view challenges and pain as positively as younger runners. With the average participant over the age of 40, it is important to note

that “older runners” in this context are individuals that are around the age that most individuals retire. Future studies could benefit from looking at not necessarily just age, but perceived number of years left in the sport due to burnout, injury, etc.

Responses were compared among males and females. Males agreed more with two characteristics: *An inner arrogance that makes them believe that they can achieve anything that they set their mind to*, and, *Love the pressure of competition*. However, females ranked higher in regards to characteristics that involved self-belief in overcoming obstacles, reaching their potential, reminding themselves of goals/aspiration/purpose, patience/discipline/self-control in training, awareness of negative self-talk, and focus in success/moving forward when necessary. This could be interpreted as females approaching from a more psychological/cerebral direction, while males find their mental toughness fuel from confidence and competition. Male and female participants did not have significant differences in other racing/competition characteristics, which were congruent with research that found the competition gender-gap narrowing, and that competition pressures equally affected male and female performances (Frick, 2011).

Comparisons were also done with the participation description outliers of those reporting themselves as being Very Recreational or Very Competitive. The most significant finding was that one characteristic: *Thrive on opportunities to beat other people in training*, still ranked very low ($M = 2.88$) among those describing themselves as Very Competitive. This could be that individuals do not find training as the time to compete with others, but, rather, training provides the preparation needed to compete and win on race day. There were no statistically significant different mean scores in which Very Recreational ultramarathon runners agreed more than Very Competitive ultra

runners. The largest difference in means was for the characteristic: *Love the pressure of competition*, in which very competitive ultramarathon runners had statistically significantly higher mean scores. The aspect of competition in defining mental toughness and components of mental toughness will be revisited in the remainder of the discussion section.

In conclusion, only certain aspects of the characteristics of mental toughness received statistically significant correlation among the ultramarathon running participants. Thus, a new list of characteristics can be established to limit the competitive context and focus more on perspective, reflection, and psychological skill implementation. Additionally, the Jones and colleagues' (2007) list of characteristics is void of the distinction between what describes a mentally tough athlete and what mental toughness allows one to do. While some characteristics had stronger correlations, and some attributes can be taken into consideration in ultra running, the present study found the existing list of attributes to not be ideally applicable to the population of ultramarathon runners.

Discussion of Phase 2: Defining Mental Toughness from 476 Definitions

Another limitation of the mental toughness research is exhibited in few studies involving a large sample, or utilizing a large sample (as opposed to a small focus group of elite athletes) to provide definitions of mental toughness. No studies had used a sport-diverse or sport-specific sample in this manner. The objective of the second research question was to attain a definition of mental toughness from as many ultramarathon runners as possible. The researchers were aiming for at least 75-100 definitions and were ecstatic to have attained 476. All of the definitions were coded based on four broad

categories: Persistence/Perseverance, Psychological Skills, Environmental/External/Preparation Factors, and Other. Mental toughness research has proposed having multiple forms of mental toughness that would be applicable to different types of performances, such as those during finite pressure moments, instances relating to immediate physical danger and, most importantly, the concept of ‘endurance’ mental toughness related to the rigors of training (Bull et al., 2005; Crust, 2008).

Many of the definitions encompassed multiple themes; thus it was pertinent to break down longer definitions into excerpts and code each theme separately. Multiple coded themes in each definition represented the multifaceted context of defining mental toughness in ultramarathon running.

The definitions also included specific examples that represented mental toughness. Some examples discussed times in which the ultramarathon runner persisted to finish despite severe injury, to which the severity was not always realized until after the completion of the event. Other examples discuss overcoming challenges such as getting lost and then fighting time cutoffs.

Above all, themes under persistence were by far the most frequently cited by participants. These included the ability to: keep going, never quit, continue running through discomfort, overcome mental and physical fatigue, persevere through adversity, and possess the strength to push through perceived limitations. The next category involved utilization of psychological skills such as goal-setting, self-talk, focus, reduction of negative thinking, and maintenance of confidence by reminding oneself of past successes. The final theme was more technically based, including social aspects, environmental considerations, and the logistics of training. The goal when constructing

the definition of mental toughness was to include all of the most cited themes. The challenge was isolating a definition that described what mental toughness *is* in ultramarathon running, aside from what mental toughness may allow someone to do.

The definition that emerged from the 476 responses included what mental toughness is, with action-based supplements. The final definition was:

Mental toughness in ultramarathon running is the ability to persist and utilize mental skills to overcome perceived physical, psychological, emotional, and environmental obstacles in relentless pursuit of a goal.

a. Mental toughness in ultra running also allows a runner to overcome perceived physical and mental fatigue, especially in the most challenging parts of training and competition.

b. Mental toughness means maintaining emotional control and self-talk to combat negative thinking and remain positive, to focus on association/dissociation as needed, and run smart and tune into the body to prevent injury and address physical needs.

In addition to the definition above, a figure was developed to show distinctions of traits of mentally tough ultra runners and what mental toughness may allow an ultramarathon runner to do (see Table 10).

When comparing this definition to others in the mental toughness literature, many commonalities are evident, such as perseverance (Middleton et al., 2004b), persistence (Crust, 2007; Parkes & Mallett, 2011), striving towards a goal (Connaughton et al., 2010; Gucciardi et al., 2009, 2009a; Jones et al., 2007; Mallett & Coulter, 2011), focus (Bull et al., 2005; Crust, 2008; Jones et al., 2002, 2007; Thelwell et al., 2005), and cited broadly,

other definitions have also included overcoming adversity (Clough et al., 2002; Gucciardi, 2012).

One of the central issues is that many definitions do not include the aspects that can make ultramarathon running most challenging (thus requiring more mental toughness), or aspects that can lead to higher enjoyment or success in ultramarathon running. It is important to not just look at the negative aspects of overcoming challenges when understanding mental toughness as a construct (Nicholls et al., 2008). Sport-specific attributes of mental toughness in ultramarathon running include overcoming the long-duration mental and physical fatigue, focus/distraction to cope with the potential monotony of running for such a long duration, and the implementation of psychological skills to enhance the positive running experience and support the ability to relentlessly push forward. Thus, existing definitions were not sufficient to address what mental toughness is in ultramarathon running. Aside from the extremely long duration of both training and competition, one of the most pertinent aspects is the environment. In ultra running, much of the training and competition is done on trails, which can be very technical and challenging, with high altitude, weather, wildlife, and obscurity of markings as additional aspects. Other sport environments do not have the same level of unpredictability, or require one to be flexible and cope as readily.

Even when examining the root of the first phase of the present study, which was grounded in Jones and colleagues' (2007) attributes of mental toughness, it was important to avoid testing the previous researchers' definition of mental toughness. The definition from Jones and colleagues' (2002) study was developed from a small sample of elite athletes, and then confirmed with a focus group of three elite athletes. The definition

highlighted the psychological edge that allows an athlete to *generally cope better than their opponents with the many demands that sport places on a performer, and specifically be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure* (Jones et al., 2002). While certain aspects of this definition are applicable, the “opponents” piece is simply not as relevant in a sport with a lower emphasis on competition. Additional research has supported that pushing beyond perceived limits to finish, in contrast to exceeding perceived limits to attain a fast time or win, defined successful performance among female ultra runners more accurately (Hanold, 2010).

Other definitions could be more applicable, for example: *Mental toughness is defined as a collection of values, attitudes, emotions, and cognitions, that influence the way in which an individual approaches, responds to, and appraises, demanding events to consistently achieve his or her goals* (Gucciardi et al., 2009). This definition highlights the perception component, and can apply to how ultramarathon runners overcome perceived limitations and pursue goals.

An important consideration for examining the definitions of mental toughness is the idea of *perceived limitations*, whether they were physical, psychological, and/or environmental (such as the time factor). Participants had many definitions which included excelling beyond limitations or enduring pain to keep going and relentlessly pursuing completion. Limitations are a subjective construct; thus participants may be referring to going beyond where they thought they could go, or what was previously deemed possible. This distinction was not covered in prior research on defining mental toughness. Another aspect of ultramarathon running which has not been explored in other research is

the pain to fatigue continuum. Runners talk about pushing through, enduring, overcoming, or even reveling in, and embracing pain. The participants may be referring to a point along the continuum closer to extreme fatigue rather than how others may define pain. Pain could mean an injury or ailment not conducive to appropriate continuation of running.

It was clear in the data that there also existed categories of runners who would continue on and never quit, no matter what. One definition included the words “Death before DNF (did not finish).” However, the definitions also included the frequent theme *of running smart*, which included references to tuning into the body, and distinguishing fatigue, or “regular” pain, from injury pain. Even while mental toughness was described as being able to overcome adversity, pain, etc., the difference between dropping out and continuing on can mean not running in another ultra or running at all for up to six months or permanently, depending on the damage. While one can view mental toughness as always being a positive construct, Crust (2008) brought to light that fact that being (overly) mentally tough can be detrimental to recovery or prevention of injury. One study found that mental toughness correlated negatively to adherence in clinical rehab, and deduced that very mentally tough athletes may appraise their injury to be less severe (Levy et al., 2006).

Clearly, there are runners who have the “complete at all costs” attitude, who are willing to take the risk, and then there are those ultramarathon runners who may weigh the pros and cons of a potential DNF in the face of potential injury. One should also consider the mental toughness associated with choosing to DNF, runners talk about how it is harder to quit than to decided to continue, despite extreme fatigue and pain. This is

discussed further in the general discussion section. On the opposite end of the spectrum, there were also participants who identified themselves as not being mentally tough because they enjoy running, feel that they employ other factors aside from mental toughness, or see ultramarathon running as not requiring the most mental toughness when compared to other situations.

Discussion of Phase 3: Semi-Structured Interviews

The third phase of the present study was designed to address research questions on confirming the definition of mental toughness, identifying traits of mentally tough runners, personal experiences and observed examples of mental toughness, and how mental toughness can be developed. The sample of 12 interviewees was selected randomly, but did encompass diversity in age, gender, years running ultras, types of ultras completed, participation description, and location. The semi-structured interviews were coded similarly to the definitions of mental toughness because analogous themes emerged from the data. The following discussion section will focus on most pertinent themes among interviewees, agreements, contradictions, unique responses, those that correlated to defining mental toughness, and new themes that emerged. The most prominent theme that came up among multiple questions was **perspective**; it has been bolded to show how it played a role in various contexts. This is important to note, as perspective has not been discussed in prior mental toughness literature. Another repetitive theme that came up in multiple questions and was a central aspect of defining mental toughness was persistence and perseverance. The other themes discussed below remained relatively isolated in the context of individual questions. Additional comments from the

end of the interviews were incorporated throughout to address relevant research questions.

Research Question 2: How can mental toughness be defined in ultramarathon running?

The raw definition of mental toughness was adequate for the early stages of the present study; however, asking interviewees to provide feedback allowed for expansion in regards to emotional aspects and perception. Both Brittany, the 34-year-old recreational ultra runner, and Evan, the 57-year-old recreational ultra runner, talked about the importance of incorporating overcoming emotional challenges. Hank, the 63-year-old competitive ultramarathon runner, also contributed by noting the missing aspect of **perspective** in the wording of the definition; “unconventionally long duration of time is really in the eye of the beholder.” He discussed how it is more important to emphasize that mental toughness is pushing beyond where you believe you can go. In another interview, Landon, the 24-year-old ultramarathon runner, talks about this duration **perspective** as well.

It is about perspective. I’ve done 50 mile races where you go into them and you get to mile 40 and you’re just completely spent and you think, “this is ridiculous, how am I going to run another ten miles?” Whereas, because, you know the end is at 50. Where, if you get into a 100-miler, and you go to 50, you’re halfway, you still have to do that again. So, the 50 doesn’t seem as bad as the finish line of a 50. And maybe that’s because of different; you know you’re running harder for shorter distances.

Thus, defining mental toughness in ultramarathon running involves the definition established, with the addition of the emotional and **perspective** components. An added congruence between the data from 476 definitions of mental toughness and the semi-structured interviews was that mental toughness meant accomplishing something that was previously thought to be impossible. Kelly, the 44-year-old female very recreational

ultramarathon runner, talked about doing something that she never thought she would be able to do. She talked about the perseverance and determination going into ultramarathon running and the realization of her achievements. Kelly also associates part of her attitude to the idea that “don’t tell me I can’t do it.”

Research Question 3: What are traits of a mentally tough ultramarathon runner?

Participant responses to this question were most congruent with themes in the definitions of mentally tough ultramarathon runners. The traits included extreme persistence, positive self-talk, awareness, overcoming adversity, determination, perseverance, self-belief, and the ability to know the difference between fatigue and injury pain. Two interviewees also emphasized that mental toughness also meant possessing the physical toughness or awareness.

This was one of few questions and methodologies that could be compared to previous research, as other studies in mental toughness have asked a small sample to identify traits of mentally tough athletes or performers (Bull et al., 2005; Jones et al., 2002, 2007; Middleton et al., 2004; Thelwell et al., 2005). Some traits were consistent, but those that had not been cited in previous research included remaining calm, the ability to cope with unusually high levels of perceived exertion, and the ability to withstand physical fatigue/pain for an extended period of time. Traits of mentally tough ultra runners as identified from the definitions of mental toughness can be found in Table 10. From the qualitative interview phase, traits of mentally tough runners include: Extreme persistence, obsessive, calm, positive self-talk, awareness of body/physical limitations, maintaining high physical perceived exertion, overcoming mental/physical challenge, determination, willingness to suffer, groundedness, mental reserve, the ability to push

themselves to do things that other people aren't willing to do, commitment, goal-oriented, perseverance, and perspective.

Two separate participants discussed the importance of persistence in ultramarathon running, as well as in life. This was mentioned in the context of persisting through to the finish in training runs, ultra events, as well as graduate students and achievement of career aspirations. Allen, the 58-year-old male recreational ultramarathon runner, talked about not being the most intelligent member of his graduate school class, but finishing on time in comparison to other "smarter" students, because he had the persistence, and the "I just don't quit" attitude. He stated that he isn't a super talented athlete, but will stick with it and always finish.

It is important to note that certain traits aligned based on participation description. There was only one trait mentioned that involved comparison to other people/runners. George, the very competitive ultramarathon runner, said:

When you walk up to the start line, you say "I'm going to finish this event." And if you don't have that commitment, you don't have that trait within you to say I'm going to make the commitment and I'm going to do it, is really the difference between the people that finish and the people that don't.

Brittany, a recreational runner, talked about psychological skill-related traits of remaining calm, having positive self-talk, staying in the moment and not panicking when something goes wrong.

Research Question 4: Experiences and Examples of Mental Toughness

Interviewees provided many descriptive and specific examples of when they felt particularly mentally tough. Allen, the 58-year-old recreational ultramarathon runner, cited that he felt most mentally tough when accomplishing a longer distance for the first

time. It makes sense that self-confidence and self-efficacy (as aspects of mental toughness) can be increased through his capability to be successful at a farther distance than previously achieved.

Brittany, the 34-year-old recreational, ultramarathon runner, and George, the 47-year-old ultra runner who had different viewpoints on traits of mentally tough runners, both had similar examples of when they felt particularly mentally tough. Brittany discussed her first 100-miler, which involved the extreme environmental conditions of Hawaii in the summer, which was very different from her typical training environment, with challenging terrain, heat, and humidity. George also cited experience with a race that has extreme conditions that are challenging to train for. George talked about feeling mentally tough and persisting through the Badwater Ultramarathon. Another runner, Ian, the 78-year-old competitive ultramarathon runner, reflected on a time when he got lost for about 45 minutes during the JFK 50-miler, and then had to fight harder to make time cutoffs.

One of the unique responses within this question, but consistent with the **perspective** theme, was when Frank, the 46-year-old ultramarathon runner mentioned struggling through a 100-mile race at mile 80. He was able to reflect on past successes overcoming stress, or challenges, and use that to fuel him to finish the race. Additionally, on this theme, Denise, the 31-year-old ultramarathon runner noted how one could feel differently about one's mental toughness during an event, as opposed to analyzing the performance after. During her race, she felt "incredibly weak," but then realized her mental toughness when looking back and thinking about how she continued on despite feeling terrible physically, and enduring challenging weather. An additional response

that was distinct from themes in the definitions of mental toughness was that of not going through the challenging experiences of an ultra alone. Charlie, the 37-year-old competitive ultramarathon runner, stated:

My experience is that everybody is suffering, so there is no easy way out. There's no magic bullet, no magic pill. There's some people who might be faster, and they don't look like they are working that hard, but they are actually suffering just as much as everyone else. So my experiences have taught me that everyone just has to do it, and if you're able to keep going, you're going to finish it.

Another interviewee, Hank, the 63-year-old, who has been completing ultras for 15 years, talked about an experience of continuing on through the night during a 100-mile race, he then talks about how this experience may or may not be defined as a moment of being "particularly mentally tough":

So I guess the issue there is, was my continuing on mental toughness? I'm not sure if it was so much mental toughness, I think you'll find most people that do ultra distances are probably a tad humble for that. They don't look at what they're doing as necessarily mental toughness. They look at it as continuing to challenge themselves.

In defining mental toughness, some definitions simply stated "finishing," or overcoming any and all barriers to finish, although when a runner finishes after the cutoff, according to the race officials, the individual is not considered a finisher. This point is further deliberated in the general discussion section. Kelly, the 44-year-old female ultramarathon runner, talks about one of her most mentally tough experiences, when she actually did not finish a race under the cutoff because of getting lost and found out that she would not be considered a finisher when she was about six miles from the finish. Instead of giving up, as she was told, she powered through and completed the

remaining miles. In her mind, she had come out to complete 50 miles that day and was not going to leave until that goal was accomplished.

The second part of addressing this research question was asking participants to talk about a time when they witnessed mental toughness in someone else, and what that looked like to them. To date, little research has been conducted in identifying mental toughness from an external construct. All of the literature is based on qualitative responses to build understanding of what mental toughness is, or self-report measures identifying aspects of mental toughness (Crust, 2008).

The most frequent theme in observations of mental toughness concerned older runners. Four of the interviewees talked about seeing older runners persevere and overcome both physical and societal obstacles to be successful (Vertinsky, 2000). One interviewee, Brittany, discussed how older runners have to be mentally tough to endure not just the physical and mental challenges, but to be strong enough to defend themselves against jokes and putdowns from society and even other runners. The other runners who mentioned the level of mental toughness in older runners were more focused on how the older (than average) ultramarathon runners as mentally tough due to their persistence and determination to continue on. This later view still sees age as a hindrance, or added challenge, rather than focused on the psychosocial obstacles. This argument can be supported by the characteristics of mental toughness that older runners agreed with significantly less, such as effective use of a challenging training atmosphere, or the ability to overcome any obstacle. The question is if these are real aspects of mental toughness that older participants have less control over, or is it simply that older runners have other obstacles to deal with?

Another common theme of witnessing mental toughness was seeing someone overcome extreme environmental conditions, such as extreme heat and cold, or the specific challenges associated with multiday races. These challenges have shown to be completed by those who have different motivational orientations than those completing marathons (Doppelmayr & Molkenhain, 2004). George, the male very competitive runner, reflected on completing the Marathon des Sables (Six consecutive marathons in six days across the Sahara desert); he emphasized how challenging it was, but then thought about individuals who were finishing long after him on each day:

...realizing that other people had to do it, much, much slower, and be out there much longer... and fathom that they had just done what I had done, it was so ridiculously difficult and it had taken them so much more time and effort, that I realized that was not a physical situation, but something mentally that they had to just continually put themselves through day after day after day. Multiday events are when you really see the toughest people; you have to get up and do it all over again.

Another theme, which relates back to how we define mental toughness, and the question as to if it has to involve finishing, is the individuals who are at the back of the pack fighting time cut-offs all day. Landon, the 24-year-old ultramarathoner, talked about seeing ultra runners come in right at or even after cut-offs at a 100-mile race. The mental toughness factor is associated with the fact that the runner has been out there longer than anyone else, enduring the elements, burning through energy, and reaching higher and higher levels of physical and mental fatigue.

Analyzing mental toughness from this perspective can provide a more objective basis for understanding the psychological construct in ultramarathon running. In both personal experiences and observations, bringing mental toughness to light can provide ultrarunners with an identification of *that* factor which allowed them to persevere through

both long duration and potential adverse physical, psychological, emotional, and especially environmental obstacles. Training and building the physical and mental endurance to complete an ultra is a challenge in itself, but except for two responses, all of the experiences and examples of mental toughness included race-day stories and anecdotes.

Research Question 5: How is mental toughness developed in ultramarathon running?

Developing mental toughness and understanding how mental toughness may change or increase over time, or if it is innate, can be valuable information for both researchers and practitioners. The nature versus nurture debate is addressed as many runners talk about specific ways that their mental toughness has been increased, honed, or modified over time. In one study, researchers evaluated how psychological skills training helped positive psychological development and aspects of mental toughness (Sheard & Golby, 2006). This question did not have many themes of directly utilizing psychological skills to enhance or facilitate the development of mental toughness. More of the focus was on general experiences, and overcoming challenges in training and competition.

Two participants reported that upbringing, heredity, or parental influences played a role in the development of their mental toughness. George, the 47-year-old runner who has been competing ultras for over a decade, attributes his mental toughness to growing up in a remote area and having daily life challenges. Additional research on elite athletes' mental toughness has supported this idea that upbringing and parental influence provided the foundation for later mental toughness development through transition or an individual's environment (Bull et al., 2005; Connaughton et al., 2008; Crust, 2008)

However, the environment and experiences throughout life were also cited to play a pivotal function in development of mental toughness. Brittany, the female who has been running ultras for eight years, discussed how cumulative the process is, and how each experience- both positive and negative, contributes to the development of mental toughness. Charlie, a male competitive ultra runner, talked about experience within a race, knowing what to expect, anticipating the feelings and understanding that “you don’t have to be superhuman to keep moving”, he elaborated more on mental ability:

You just have to keep moving forward, being mentally tough, you can get away with a lot. Lack of physical ability, is actually... If I was going to build the perfect ultra runner, I’d give him more mental strength than physical strength and give him more mental toughness than raw physical talent.

Based on how Charlie describes mental toughness and “building the perfect ultramarathon runner,” it sounds as if mental toughness might be a combination of both innate attributes and developable skills.

Jack, the male competitive runner who has been running ultras for almost five years, talks about development of mental toughness from good examples, ultra community social support, and learning from what works for other runners. He utilized this knowledge as a foundation to see what was most effective for his ultra running success and mental toughness.

Denise, the female ultra runner who has been completing ultras for two years, also mentioned attaining inspiration and fuel from other runners completing amazing races and accomplishing ultra feats. She was also the only ultramarathon runner to mention social pressure from others in regards to individuals expecting her to finish and do well, and the idea of being mentally tough enough to have no excuses to ever quit, unless

someone (medical/race personnel) had to pull her from a race. This again touches on the idea of never quitting and continuing on no matter what the cost. Denise describes herself as a recreational runner, yet has the desire (as mentioned earlier in the discussion) to finish despite potential long-lasting physical implications. She even states:

I would rather have someone make that decision for me- as in, I blacked out and someone had to carry me out in a stretcher/my leg was in multiple pieces.

One of the central themes, which will be examined more thoroughly in the general discussion, is that of comparing mental toughness and success in ultramarathon running with success or other positive aspects of life. Frank, the 46-year-old recreational runner, discussed how his mental toughness developed due to the stability he had in his life, being older, and having “pretty much everything I want.” He talks about having this balanced foundation, which granted him the healthy platform to pursue the demanding sport of ultramarathon running. This point contradicts what another interviewee stated about ultrarunners who may be struggling with some challenge, issue, addiction, or other problem in their life, and utilize ultra running as a means to escape or cope.

General Discussion

Examination of the online survey based on Jones and colleagues’ (2007) definitions of mental toughness revealed that some traits are applicable to the ultramarathon running population. However, those involving competition, comparison, or ultra participation as one’s number one priority were less relevant to the present population. Components of mental toughness such as focus, persistence, and overcoming adversity, were found consistently in defining mental toughness in ultra running and the semi-structured interviews. These factors were repetitious from past studies on mental toughness. Additional aspects of mental toughness, potentially more of a pertinent factor

in ultramarathon running, included duration, environmental limitations, and perspective.

From coding 476 definitions of mental toughness, and supporting details from semi-structured interviews on mental toughness in ultramarathon runners, a sport-specific mental toughness definition was established in response to research emphasizing the need to establish a definition distinct to the demands of the situation (Bull et al., 2005), in this case, ultra endurance-related factors. In the semi-structured interview phase, participants verified a raw definition of mental toughness, and added that duration and emotion needed to be components for consideration. These recommendations support the importance of including an emotional component in ultra running, stemming from research on emotional states in ultra runners (Lane & Wilson, 2011), and recognizing the intensity and variety in emotional experiences before, during, and following competition in ultra-endurance events (Bull, 1989; Raglin, 2007).

The definition that ultimately emerged was: *Mental toughness in ultramarathon running is the ability to persist and utilize mental skills to overcome perceived physical, psychological, emotional, and environmental obstacles in relentless pursuit of a goal.*

That is supplemented by: (a) Mental toughness in ultra running also allows a runner to overcome perceived physical and mental fatigue, especially in the most challenging parts of training and competition, and (b) Mental toughness involves maintaining emotional control and self-talk to combat negative thinking and remain positive, to focus on association/dissociation as needed, and run smart and tune into the body to prevent injury and address physical needs.

The concept of running smart was verified from previous studies, which found that elite distance runners utilized association to check pain level, and analyze

physiological feedback (Morgan & Pollock, 1977). Identifying important aspects of mental toughness and traits of mentally tough runners can strengthen research on developing a mental skills action plan. Mental skills training programs for ultramarathon runners should take into consideration psychological skills such as relaxation, association, and reduction of negative thought patterns and emotional states. In addition, an understanding of mental toughness elements such as overcoming physical and mental fatigue and maintaining persistence and determination for long durations of time should be considered (Bull, 1989).

In analyzing the third category (see Table 9) of definition responses, participants highlighted the importance of preparation: physical, psychological, and logistical. Micklewright and colleagues (2009) found that ultramarathon runners reported elevated levels of confusion in a POMS assessment conducted before the start of a race. Increasing mental toughness through planning and preparation can reduce the occurrence of confusion and positively impact cognitive appraisals of the situation and a runner's self-efficacy before the race.

Participants in the semi-structured interview phase identified experiences and examples of mental toughness. Many of these included overcoming (unpredictable) environmental difficulties and inspiration from other runners with sporadic mentioning of themes from the mental toughness definitions, such as persistence, perspective, and focus on goal attainment. The final research question, on how mental toughness could be developed, was also addressed in the interviews. Ultramarathon running interviewees mentioned aspects of both nature (heredity) and nurture (environment/experiences). More emphasis was placed on experiences in ultramarathon running, such as conquering a new

distance, reaching a new goal, or overcoming a negative training run. Experiences also encompassed those attained from life, with references to mental toughness and ultra running success from global understanding, stability, and life satisfaction. It was interesting to note this last point, according to a few other participants; instability and life challenge can also contribute to ultramarathon running serving as a way to cope.

Controversial topics associated with completion/DNF and the “fatigue to injury pain continuum” also emerged in the progression of this research. Some ultramarathon runners were polarized when defining mental toughness, while some cited mental toughness as relentlessly persisting forward no matter what circumstances. Others defined it as knowing when to quit or back off to prevent long-lasting/permanent damage. One runner cited the instance of Brian Morrison collapsing 300 yards from the finish line of the 2006 Western States 100 as mentally tough, since his mind was somehow able to override his body’s desire to stop or scale back. Participants also talked about which required more toughness, finishing no matter what, or quitting; either decision could produce physical and/or psychological consequences. The concept of “never quitting/stopping/giving up” was a factor in both the definitions of mental toughness and in the semi-structured interviews when discussing traits of mentally tough runners and experiences feeling mentally tough. This was not included in the final definition because it would contradict the ability to physiologically and psychologically respond to survival/preservation-related biofeedback. While relentless pursuit is an important characteristic, finishing or reaching a goal was interpreted as a healthier view than never giving up, even when it could be unsafe to continue.

An existing debate in mainstream endurance athletics is if athletes are still considered a “finisher” if they are unable to complete a race in under the time limit. For the present study, the exclusion criteria dictated that a runner had to have *completed* an ultramarathon of 50 miles or more. Do those that attempt ultras of 50-miles, 100km, or 100-miles and are unable to make time cut-offs mean that they are not mentally tough? There also exists the difference between those who have missed a progression cut-off (before the end of the race), but continue on to finish the miles, and those that miss a cut-off and call it quits. In the Ironman Triathlon, the cut-off is 17 hours, and even those coming in seconds after this time are not considered official Ironman finishers. Existing research has compared physiological characteristics/conditioning (Knechtle, Knechtle, Rosemann, & Lepers, 2011), mood profiles (Tharion et al., 1987), and personality profiles (Folkins & Wiselberg-Bell, 1981) between finishers and non-finishers in ultra endurance events. Future studies could analyze what mental toughness characteristics potentially allow finishers to make it under the cut-offs in comparison to those who did not finish. Additional studies could also identify which characteristics of mental toughness are most in play when an athlete decides to continue on, knowing they would not be considered an official finisher.

It would be important to revisit the competition factor in ultramarathon runners. Characteristics associated with competition and comparison to others ranked low from the online survey, thus implying that while there exist many competitive ultramarathon runners, this trait is inconsistent across the sport. Logistically, runners who are competing in events lasting many hours are more likely to be spread out, with many runners alone or with only their pacer for a majority of the race. The more important factor relating to

competition is that of competing against oneself, meaning battling against perceived physical and psychological limitations, personal bests, or completion rates. One interviewee noted that competition is almost like an excuse, and that thinking you are more mentally tough than someone else is devaluing your own and their performance. The ultramarathon runner stated that the biggest competition in ultramarathon running is between oneself and the environment. This view of competition may be different than shorter duration events, or those that have more dense participation, such as a marathon or Ironman triathlon. Increased social pressures, such as another athlete passing, or presence of spectators, can contribute to competition in other sport avenues.

One of the strengths of this study was the ability to define mental toughness and identify the most pertinent traits of mental toughness in ultramarathon runners who had successfully completed an ultra event of 50 miles or more. However, this excludes populations of endurance runners who may be able to complete other distances, but either have yet to try, or be successful at completing an ultra. An important avenue of exploration would be to uncover what aspects of mental toughness allow an individual to make the leap from being a distance runner, or a marathon runner, to an ultramarathon runner. In this area, it would be helpful to recognize the psychological barriers that keep aspiring ultramarathon runners from accomplishing their goals. Recommendations for future research suggest identifying lessons from ultramarathon runners to how this hurdle was surmounted and what are specific skills or traits that allowed them to successfully complete an ultramarathon.

A final exploration of the present study is the strong link of mental toughness in ultramarathon running as compared to mental toughness in life. In three interviews with

ultramarathon running participants, it was noted that life experience and aspects of mental toughness allowed the individual to be successful in both ultramarathon running and other situations (such as graduate studies) which required persistence, determination, and a strong goal-orientation. Interviewees discussed that perhaps their mental toughness contributed to their overall success, or that the optimal performances contributed to their holistic mental toughness. Understanding mental toughness in this context has a much more global application; particularly when considering that mental toughness could be developed through specific experiences, or over time.

The present study contributed to the understanding of mental toughness, how it can be defined, and developed. While this information can be highly beneficial to those in the ultramarathon running community, implications are overarching in other ultra endurance sports with similar attributes, as well as in the greater global community, where being mentally tough can lead to greater success. The participants had an impressive level of awareness in reflecting on their experiences and perceptions of mental toughness. The experience of understanding mental toughness from such a population of passionate athletes has inspired the researcher to ambitiously pursue new running goals, and exceed all prior running expectations throughout the thesis process.

Implications for Practice

The following implications for practice emerged from this study:

1. In the broadest scope, sport psychology professionals and coaches alike can benefit greatly from a more finite understanding of mental toughness, components within the construct, and how it can be developed. The field can also benefit from a greater understanding of the sport of ultramarathon running.

2. Specific implications from the present study focus on ultramarathon runners and those supporting them, sport psychology consultants, coaches, trainers, and even peers can benefit from the sport-specific definition of mental toughness and list of attributes. Benefits extend beyond simply understanding mental toughness into the domain of identifying how it can be developed to contribute to successful performance.

3. Practitioners aspiring to work with ultra endurance runners should be made aware of the accessibility of the ultra population, and their willingness to discuss psychological constructs. Many of the definitions of mental toughness and responses in semi-structured interviews mentioned psychological skills training, which could be further enhanced through work with a sport psychology consultant.

4. Coaches working with endurance athletes can utilize many of the definitions, quotations, and inferences of what constitutes mental toughness as a source of inspiration and motivation for athletes.

5. Consultants can build on training programs designed for ultramarathon runners, and incorporate controllable skills such as preparation, imagery, focus, and positive self-talk in efforts to improve performance, likeliness of completion, and ultrarunning enjoyment.

6. Practitioners should be aware of the many interpretations and perceptions of mental toughness and understand aspects of running smart as well as identifying potentially detrimental attitudes, such as the desire to complete an event regardless of injury pain.

Implications for Research

The following implications for research emerged from this study:

1. Researchers aspiring to further the research of psychological aspects of ultramarathon running can benefit from methodology to attain a large sample size. However, the student or professional must also understand that many ultramarathon runners accessed in this manner encompassed a limited demographic.

2. As in the present study, researchers examining ultramarathon running should read books and publications on ultra running, understand the distances, some of the most popular races, and develop an understanding of the ultra culture.

3. Researchers can benefit from utilizing a mixed-methods approach, but should also note the amount of potential data and consider selecting a more narrow focus when establishing research questions.

4. When developing an online survey utilizing questions and characteristics that have not been implemented with a population, researchers need to understand the potential for low completion rate and establish standards for what data should or should not be included.

5. Researchers should be aware of the number of ultras that many ultramarathon runners have completed, and not include running-relevant questions asking them to list them all, rather, these data can be collected by simply asking how many ultras the runner had completed and/or have the ultrarunning check off completed distances or popular races. Researchers could also benefit from a narrow scope of examining runners only from a specific race.

CHAPTER 5
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS
FOR FUTURE RESEARCH

Summary

It is clear that mental toughness plays a large role in the demanding sport of ultramarathon running. To address a gap in the literature, the present study sought to define mental toughness, understand traits of mentally tough runners, and how mental toughness can be developed in an ultra endurance sport population. A large sample was utilized in phases one and two to examine existing characteristics of mental toughness and develop a large pool of definitions of mental toughness from which to build a sport-specific definition. The third phase was to attain more in-depth experiences of ultramarathon runners, and assess how their mental toughness developed.

Key findings were that the Jones and colleague's (2007) definition of mental toughness was not comprehensive enough to be applicable to an ultramarathon runner population; thus, a new definition and set of traits needed to be established. The 476 definitions of mental toughness yielded both a new definition and a list of traits of mentally tough runners. One of the strengths of this method was the large sample size, and distinction between what mental toughness *is* versus what mental toughness allows a runner *to do*. The most pertinent findings are the unique aspects of mental toughness in this sport, which include a heavier emphasis on persistence, perseverance, fatigue/pain recognition, psychological skills, and adaptation to environmental challenges, including duration of events and training periods.

The semi-structured interviews brought to light the importance of the ultra community and inter-sport social support in allowing one to develop mental toughness. The interviews also yielded a strong emphasis on perception and experience through running and life successes/challenges. Ultramarathon runners identified times when they felt most mentally tough as when they overcame physical, psychological, and environmental obstacles, kept going, or never gave up on their goals, and learned from training experience. In terms of witnessing mental toughness in other ultramarathon runners, the interviewees cited overcoming both physical and environmental adversity, and especially seeing older runners persevere and maintain longevity in the sport. Life experience was cited as an important component in the development of mental toughness, particularly with respect to individual attributes of mental toughness prior to getting into ultramarathon running.

Conclusions

The following conclusions were derived from the results of this study:

1. It is pertinent to not consider mental toughness universally defined in every sport, particularly in respect to various sport demands, differing environments, and participation orientation (competitive/recreational).

2. Mental toughness is a crucial element in ultramarathon running and a comprehensive definition can be developed and then verified through semi-structured interviews.

3. Mental toughness in ultramarathon running can be defined as: *Mental toughness in ultramarathon running is the ability to persist and utilize mental skills to overcome perceived physical, psychological, emotional, and environmental obstacles in*

relentless pursuit of a goal. This is supplemented by: (a). Mental toughness in ultra running also allows a runner to overcome perceived physical and mental fatigue, especially in the most challenging parts of training and competition, and (b). Mental toughness involves maintaining emotional control and self-talk to combat negative thinking and remain positive, to focus on association/dissociation as needed, and run smart and tune into the body to prevent injury and address physical needs.

4. Traits of mentally tough ultramarathon runners as drawn from 476 definitions of mental toughness and semi-structured interviews include: persistence, perseverance, determination, awareness, goal-orientation, commitment, focus, motivation, and strategies in place for physical and mental preparedness.

5. Comprehensive insight was gained on the ultra community and demands of being an ultramarathon runner by citing specific experiences and examples of mental toughness. Ultra runners felt most mentally tough when they persisted through adversity and learned from challenging experiences. Ultramarathon runners are inspired by others' ability to overcome adversity, older runners breaking through stereotypes, and the camaraderie and support of the ultra community.

6. Mental toughness is developed early on in one's running career to some degree, but more emphasis should be on the cumulative development of mental toughness throughout one's running career, life experience, and support of other ultramarathon runners.

Recommendations for Future Research

The following recommendations for future research emerged from this study:

1. The research on ultramarathon runners has grown exponentially in the last year, in respect to the growth of the sport. However, the ultra running population can be used to understand other psychological constructs, such as flow, motivation, goal-orientation, and other constructs that cannot be assumed to be prevalent in ultra athletes.

2. Other ultra endurance athletes can be examined through the mental toughness construct; future research could include ultra cyclists, endurance adventure athletes, and Ironman Triathletes (including double, triple, and quad ironman athletes).

3. Within endurance sport, it would be beneficial to conduct research on correlating mental toughness with other psychological skills and constructs, such as flow, imagery, goal-setting, motivation, and self-talk.

4. It would be beneficial to further the overall development of measuring mental toughness, and more specifically develop a measure of mental toughness that would be applicable to the ultramarathon running population. The measure would need to be appropriate for both recreational and competitive athletes, without an emphasis on comparison, and include environmental factors unique to ultra endurance sport. Even developing a mental toughness measure exclusive to runners/endurance sport would be a contribution to the study of assessing mental toughness.

5. Mental toughness is viewed through many different lenses: as a skill, construct, and personality trait. Future research could focus on comparing mental toughness to other personality measures, or mood state scales, to further define how to classify mental toughness.

6. Research could focus on comparing perceptions of mental toughness between finishers and non-finishers of ultra events, to establish what aspects of mental toughness potentially allowed a runner to successfully complete the race.

7. Within the endurance running community, mental toughness perceptions can be viewed differently between road marathon runners and trail marathon/ultra runners. An exploration assessing the various demands of the sport and level of importance of certain aspects of mental toughness could be worth exploring.

8. Longitudinal studies can explore the development and evolution of mental toughness throughout an ultra runner's career, or establish what aspects of mental toughness are more important to novice runners versus those near the end of their ultra careers.

9. The present study was based on perceptions of mental toughness in reflection of ultra experiences. It would be beneficial to gain insight on mental toughness shortly before the completion of an ultra, during, and after the event.

10. There are likely runners who maintain the mental toughness to complete other running endeavors and distances, and aspire to complete ultramarathons. It would be pertinent to address this gap in understanding what elements of mental toughness can be gleaned that can help aspiring ultra runners reach their goals.

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APPENDIX A
CONSENT FORM

Title: Perceptions of mental toughness in ultramarathon runners.

Principal Researcher: Michael L. Sachs, Department of Kinesiology, 215-204-8718

Student Researcher: Anna-Marie Jaeschke, Department of Kinesiology, 703-314-3962

Dear Ultramarathon Runner,

The purpose of this study is to build understanding of the construct of mental toughness in the sport of ultramarathon running. We hope to examine an existing construct of mental toughness and see the applicable components as related to ultramarathon running. Additionally, we hope to develop a sport-specific definition of mental toughness in ultramarathon running. To help us in this study, we are asking for your participation in the following survey, which should take approximately 10 minutes. At the end of the survey, you will be asked if you are willing to participate in a follow-up interview.

You must be 18 years of age to participate. The information you provide will remain secure. However, note that information sent through the Internet is confidential only to the extent the Internet is secure. Any part of this study that is published or presented will include pseudonyms

There are no known risks or harm associated with participation in this study. Your participation is completely voluntary and you may refuse to participate or stop at any point without consequence.

Consenting participants MUST read, understand, and agree to the following:

I understand I may benefit from participating in this study through learning about my own perceptions and experiences of mental toughness. I understand that I will neither be charged nor paid any fee for participation in this study.

All documents and information relating to this study will be kept confidential, unless required by federal, state, and local laws and regulations to be disclosed. I understand that data in this study may be reviewed by Temple University and its researchers, the main researcher, or the researcher's colleagues (if applicable), and/or university governmental agencies to assure proper conduct of the study and compliance with regulations. I understand this research may be published and, if so, I will not be identified by name.

If I have any questions concerning my rights as a research participant. I may contact the Institutional Review Board Coordinator at IRB@temple.edu or at
Institutional Review Board Coordinator
Temple University Research Administration
Student Faculty Conference Center
3340 N. Broad Street- Suite 304
Philadelphia, PA 19140

By selecting the CONSENT option below. I am indicating that I have read and understand the contents of this consent form.

APPENDIX B
DEMOGRAPHIC QUESTIONNAIRE

Basic Demographic Questionnaire

1. What is your name or a pseudonym you would like to go by?
2. What is your e-mail address?
3. What is your gender?
Male
Female
4. What is your age?
5. What is your ethnicity?
American Indian/Alaskan Native
Asian or Asian American
Black or African American
Hispanic or Latino
White or Caucasian
Other (please specify)
6. What is your highest level of education?
High School
Some College
College Degree
Some Graduate School
Graduate Degree
Doctoral Degree
Other
7. How long have you been a runner? Please specify in months/years.
8. How long have you been running ultramarathons? Please specify in months/years.
9. Please list the ultramarathon events you have *completed*. Include the name of the event, distance, and month/year.
10. How would you describe your ultramarathon running participation?
Very Competitive
Competitive
Somewhere in Between
Recreational
Very Recreational
11. The existing research on mental toughness has revealed many different definitions of mental toughness. How would you define mental toughness as it pertains to your ultramarathon running participation? Feel free to provide examples.

APPENDIX C

476 DEFINITIONS OF MENTAL TOUGHNESS

The existing research on mental toughness has revealed many different definitions of mental toughness. How would you define mental toughness as it pertains to your ultramarathon running? Feel free to provide examples. 145

**Some of the definitions contain what would be considered typographical errors, however these represent the precise responses of the respondents, and have been left as is for the purpose of this appendix.*

1. 1. "Mental toughness" is the ability to persevere through the most challenging parts of a race, particularly when every bone in your body is screaming at you to stop. It's fighting the urge to quit, to give in to the part of you that is making up all the excuses and reasons not to go on. For me, it was the 35-mile point of the 50-miler. I'd witnessed this track event many times, and saw that it was similar, but worse, than the "wall" at 18-20 miles in a marathon. I thought I'd practiced enough 40-mile training runs to break through the "wall," but I hit it and hard. I've never felt so depressed in my life. I actually stopped. If not for the urging (yelling, actually) of my coach, I might not have finished. My coach says I'm the most stubborn runner he's ever known. Others say that with my furrowed brow, and not one word, I withdrew into myself and forged on 'til I finished. Stubborn perhaps, but I prefer "determined."

2. 2. The ability to push through when your body is physically at its limits 2. The ability to focus on the task at hand and not allow your thoughts to distract you

3. 3. 20 100 mile race starts, and 20 finishes. No DNF , a/k/a/ Did Not Finish. Very unusual ratio. For an accomplished runner to attempt this distance, the question is not "Can I"? The ight question is "Will I"?

4. A requirement. I am a 5 hour marathoner (I do many different events, really participate in marathons to stay in shape). When I did my ultra, I should have stopped after 34 miles...I was physically wrecked but kept going. Hobbled the last 8 miles.

5. Ability to block out doubt for hours and hours on end.

6. Ability to carry on previously made decision despite difficult physical or mental obstacles.

7. Ability to completely focus on running, hydration, and nutrition. My mind says to moving until I get to the finish.

8. Ability to continue running long after it is enjoyable Ability to continue running during extreme physical discomfort, ie., gastro-intestinal issues, nausea, muscle fatigue/failure Ability to "will" your body forward when major muscles/organs are attempting to stop your body This is most prominent in 100 mile mountain races, to complete these, every runner must continue running through extreme discomfort, which is only possible with a strong focused mind

9. Ability to continue to a goal despite unexpected difficulties. These may include physical pain or bad weather or fatigue or failure of equipment or support.

10. Ability to do the impossible

11. ability to focus on the end goal towards completion regardless of how tired or crappy you feel, regardless of the weather conditions, regardless of the terrain,

- to understand why you have pain but to be able to overcome it in order to achieve
82. Continuing on when your body and eventually your mind tell you to stop. My
45. Being able to push through and keep going when you're exhausted and
- knowing that your body is telling you to stop and rest. He told me later that he had doubts I
46. Being able to push yourself past the point your body tells you to stop
47. Being able to put aside feelings of pain and/or fatigue to continue and
- realizing that such feelings are temporary. There usually comes a point in any
- ultra when it feels like stopping is the only sensible option, this is when I have to
48. continuing to go on when your mind and body is telling you otherwise, for
- example running myself that the feeling will pass and I just have to keep plodding
- along until it does. It's a bit like trying to turn the effort on a different level -
- looking around, take in the sights, sounds and smells of the environment and forget
49. continuing to run when my body is telling me to stop.
48. Being able to tolerate pain for the goal, yet being smart enough to know when
- you might be hurting yourself and self-allowing to stop. That's foolishness when you're trying to
50. continuing when everything in me wants to stop. But the feeling of a
- fractured tibia when I didn't know it and continued on. That was mental year and
51. being able to withstand ones preconceived physical limitations and being able
- to breakthrough into that next level of consciousness. Being able to control feels as
- celebrate or better than the pain does ever can.
50. Being willing to continue when your body and mind scream for you to stop.
51. Belief that if anyone can do something, you can do something, and then the
- ability to persevere through tolerable suffering to achieve your goal. Shorter-
52. determination to not quit even though ur mind and body is telling u
52. Determination to keep going when your mind and circumstances are sending
- messages to stop. For example- finished 20+ hour run at Mt Washington in harsh
53. Being able to bounce back from the debilitating fatigue and sometimes pain experienced
54. Determination to keep going forward no matter what the obstacle.
55. Determination to persist throughout the duration of the journey from start to
56. Disappointment. The ability to get out there day after day to achieve a goal even
57. combination of (a) above average perseverance/tenacity/stubbornness (b) high
58. tolerance for pain (c) driven to achieve and overachieve, not accept limitations
59. Doing what your mind and body tell you is the wrong thing to do.
56. Commitment to long hours of training, persisting and overcoming discomfort
57. Consistency and reliability. There will be peaks and valleys, and
58. Continue running through pain and exhaustion; during poor weather
59. Don't give up just because you are tired. There will be peaks and valleys, and
60. Just as some you have to systemically stop and have said so for hours
61. What you are on when fatigue and/or pain is very difficult to deal with. Fighting
60. Pushing through an intense desire to quit in order to achieve the goal and quit

90. For Question 11 - not sure what "competitive" you are looking for; ie top overall? top in age group? or with previous efforts at that distance or on that course? I lean toward the last definition. Mental toughness - ability to overcome obstacles that arise during an endurance effort; for example;

85. Focus on the ability to keep going when despite pain or discomfort.

86. Having the ability to persevere in the face of physical pain. It's not just about the pain, but about the mental strength to push through it.

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(listening to music, talking to someone). A racer may need to address each matter in isolation or all together, but they are all mental skills required to complete and/or compete in an ultra.

117. I don't feel like I'm mentally tough. The MS 50 I was signed up for the 50 mile but the poor weather conditions and water/sand did a number on my feet and I dropped after the 50k distance. During the 50 miler, I just had a great time. The last few miles were a bit of a struggle but after running 40 + miles what's a few more?

118. I don't know that I've ever considered myself mentally tough in many examples of what I consider mental toughness is Brian Morrison collapsing in the final 400m of the 2006 (might be 2005) Western States, somehow he had managed to override the physical demand to stop. He got it wrong by collapsing but very few people have the capacity to be able to push through the barriers and let that happen.

119. I define mental toughness in ultramarathon running as the ability to continue moving when it no longer seems possible to finish.

120. I do not find it mentally tough to run ultras because I enjoy running so much. I have trouble trying to push through it, but if I can't, I drop out. I feel I have nothing to prove and want to enjoy the journey. I have dropped out of 3 ultras.

121. I do not think I am very tough mentally, it is more about being lazy. If I run short races I hurt a lot more (because I run faster and I get out of breath) than if I run long races. It is more enjoyable for me to run longer races. Since people tell me I am tough mentally, I would define my mental toughness as knowing that if I train and if the conditions are somewhat ideal, I have the physical condition and training to be able to complete a tough and very long slow race. During a race, I am like a rider riding a horse; my mind takes the lead and my body follows. My body is the horse and my mind the rider. If I hurt a lot in a race, I would not finish. My mental toughness is just the fact that because I've

But more than mental toughness, I consider this to be running smart, keeping all systems happy and paying attention. Not getting caught up in ego. And when it comes time to push, I just settle in and feel my body. Enjoy my surroundings. If you think you can do it, you can do it. I am a teacher and to me, life is much much harder than running a 100. I am thinking of some of my students, with parents in jail, alcoholic or addicted to drugs. A 100 is only 34 hours at the most. You know it will be over in less than a weekend. So I do not think I am any more mentally tough than anybody else. However I am curious to see what the human body can do and always amazed and grateful for what my body can do.

122. I don't think that ultrarunning requires mental toughness at all. It does require a good mental attitude. Thinking positively, remembering good experiences on the same course or at the same point in a run, etc.

123. I don't think you need to be tougher than in any other sport. In fact you need to know when to bail.

124. I do think it is part mental toughness and part patience. the mental toughness gets you past the pain, the fatigue, and the monotonous nature of the race, it gets you past those barriers. Ultrarunning is a lot of peaks and valleys and opt for a nice hike in the woods. I have never experienced mental toughness so I have no idea what it is.

125. I don't consider myself mentally tough. I just detach from the misery of running for 24 hours or more. My mantra is "Let it go". I surround myself with ultra runners who harbor my views regarding distance and provide me with new perspectives. I feel mental toughness can be the same for everyone.

126. I feel I can endure distance and all of the mental games your body and mind play on you when you are out on the trail for hours. I am in a constant search of discovering my limits to running distance. I challenge myself by changing the terrain and in different climates and increasing distance. I surround myself with ultra runners who harbor my views regarding distance and provide me with new perspectives. I feel mental toughness can be the same for everyone.

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For me it is going beyond your comfort zone in distance, environment and climate. Achieving your goal of completing a distance you thought was not possible. For some, this may be a 5 k or half marathon. For me it's 40 and 50 miles with the goal of completing a 24 skrimz at the end of the year. I get close to 80 miles then I will with fan 60 unless I'm called for cut-offs, which has only

happened once in over 50 ultras... and that one I was going so hard I was seeing spots. I find that I don't get bored when out running. I am able to focus my mind on other things that can keep it busy while running. I am also able to work through pain when it is minor by telling myself it is minor. This last weekend on 50K Holiday Lake I spent 16 miles with electrolyte imbalance, and I knew I would make it, because I knew I would crawl if I had too, and nearly did for the whole way back. I focus on getting to the next aid station only, not on the distance I've covered, and distance I have yet to cover. Sometimes I break it down to sections "bar" is not set where the average human being sits. By the way, I am working on my Ph.D in Organizational Psychology, and I wanted to do my dissertation on there are people waiting for me, so I better get there. I am definitely a back-of-nearly this same topic, but it did not work for Org. Psych, would have been fine for Sports Psych, great topic.

124. I focus on getting to the next aid station only, not on the distance I've covered, and distance I have yet to cover. Sometimes I break it down to sections "bar" is not set where the average human being sits. By the way, I am working on my Ph.D in Organizational Psychology, and I wanted to do my dissertation on there are people waiting for me, so I better get there. I am definitely a back-of-nearly this same topic, but it did not work for Org. Psych, would have been fine for Sports Psych, great topic. I was giving up during 2010 Massachusetts 100 mile, but when I got to the next aid, the people there said I have plenty of time, and that I should continue. I had a pacer waiting for me there also, and he sounded disappointed that I was giving up. So I got up and continued on. From that moment, I was happy, and I just didn't think about time cutoffs anymore, and enjoyed the course with my pacer. However, at the last 3 mile or so before the finish line, I was told that I had to do 10-mile miles in place. It was at my first 50 miler. The terrain was much, much more difficult than I had anticipated, and my legs took a terrible beating. It started when my running partner had to drop out around mile 40 to avoid injury, so I was running the last 10 miles alone. By that time I was already worried about keeping up my pace to finish within the cutoff. There was also a 59-mile relay race for the course, so the only people around me were on the final leg of the relay and feeling fresh. My legs hurt so much that I could only run in spurts. The last 5 miles were on a ski slope, and involved lots of ups and downs and through grass and trees. The worst part was around mile 48, when I was so frustrated with out how long it was back to my car.

131. I ran in sleet, snow, mud up to my middle of my legs, and then high winds. I would say not the average Joe can handle such weather. I had a pacer waiting for me there also, and he sounded disappointed that I was giving up. So I got up and continued on. From that moment, I was happy, and I just didn't think about time cutoffs anymore, and enjoyed the course with my pacer. However, at the last 3 mile or so before the finish line, I was told that I had to do 10-mile miles in place. It was at my first 50 miler. The terrain was much, much more difficult than I had anticipated, and my legs took a terrible beating. It started when my running partner had to drop out around mile 40 to avoid injury, so I was running the last 10 miles alone. By that time I was already worried about keeping up my pace to finish within the cutoff. There was also a 59-mile relay race for the course, so the only people around me were on the final leg of the relay and feeling fresh. My legs hurt so much that I could only run in spurts. The last 5 miles were on a ski slope, and involved lots of ups and downs and through grass and trees. The worst part was around mile 48, when I was so frustrated with out how long it was back to my car.

132. I started out running ultramarathons very recreationally. Therefore my first huge mental challenge came when I faced an obstacle that was physically hard for me to simply accomplish, not even worrying about my finishing time and place. It was at my first 50 miler. The terrain was much, much more difficult than I had anticipated, and my legs took a terrible beating. It started when my running partner had to drop out around mile 40 to avoid injury, so I was running the last 10 miles alone. By that time I was already worried about keeping up my pace to finish within the cutoff. There was also a 59-mile relay race for the course, so the only people around me were on the final leg of the relay and feeling fresh. My legs hurt so much that I could only run in spurts. The last 5 miles were on a ski slope, and involved lots of ups and downs and through grass and trees. The worst part was around mile 48, when I was so frustrated with out how long it was back to my car.

125. I have come in first, I have come in last. Some days I run, some days I to break down and cry. Well, after a few more meters I turned out of the trees and face. I have set a course record of two. There have been some trying days along the way. Some days the dragon wins, some days we negotiate and play another almost started crying. My breath came up short and I was so angry, but somehow I forced it down and trudged up the hill. I didn't feel better until I came to the bottom of the hill with about a mile left, saw my sister who was cheering me on, and discovered that I had enough time to finish before the cutoff (I had 15 minutes to spare). During my most recent race, I experienced a new sort of difficult sections of the run.

126. I have experienced low points during ultras when my emotional mind was telling my body it was too much and intellectually I knew I could keep going. Mental toughness is the ability to overcome the emotions and push through difficult sections of the run. During my most recent race, I experienced a new sort of mental toughness. Holiday Lake was much easier terrain than any of the ultras I'd done so far. I somehow actually made excellent nutritional decisions, and as a result of those points, felt quite good throughout the entire race. When I realize, but more will not attempt because of the mental toughness. I think as people run more marathons, it is no longer a physical or mental challenge and the thought of pushing out further is a mental wall they look to break past. Just recently I had to pass me, catching up to other runners and passing them, and trying to get ahead of any of the girls I saw (just because I could gauge my results better compared to friends I run with ask about running a 50K. I think they are starting to want that other girls.) Somehow during the last 10 miles, I was super determined. I was hitting some, yes, but I just had this incredible urge to RUN, instead of the usual mental block to be removed and see what it is like to go past 20.2.

128. I have good self talk... I can't imagine anyplace I would rather be on the planet than this place at this moment...even in pain. I please-just-finish-this mindset.

129. I have learned to focus on the positive and "fix" what's going wrong with

can lead to stopping...this is something that you need mental toughness to prevent. I also find that physical pain can be overridden with mental toughness. Working through pain and emotions to continue towards one goal is what mental toughness can be defined as.

146. In the moment you are in, then you are free to enjoy that moment, the sensations in your body, your surroundings, etc. In a competitive race, I was in the moment to win. Based on my marathon times compared to the previous finishing times at the VIT 50K, I had it in my mind that winning and securing a spot at the Western States 100 miles was definitely a possibility. It had been raining for days before the race, so I was prepared to finish in under 8 hours. The entire 50 miles was covered. I finished in 1:19 hours and 17 minutes. I also got an AIGES Group award, 20 minutes, but it was a personal challenge just to take something on and FINISH IT!

147. The Great Cranberry Island 50K was held on a 2-foot wide road of road on a beach. It would just keep taking one step at a time until the race is over. At about 10 miles, I went off course by a few feet which took me off into a thick patch since it was 31 to 32 degrees. There was no opportunity to turn back on the right path. Well, I went through the thick patch, but through the thicket of the forest fueling (as well as the right mindset) I was able to tough it out. I have over 100 marathons under my belt as well as 6 marathons in two days while taking the first class with the ability to suffer and experience physical and emotional "pain" without feeling sorry for oneself. This is the most apparent definition of mental toughness I see in ultra runners. You can see it in their face and by the blisters on their feet that what they are doing is difficult, yet they dig down past that difficulty and keep going just because they can. The key is they don't feel sorry for themselves.

148. The second class of mental toughness is the ability to not say you are tired, sore, or hungry. But fundamentally I find running enjoyable, even when constantly and consciously monitoring body feedback while navigating surroundings. Though running on a hot surface, the toughness has the ability to displace the perception of pain and in reality the onset of pain in many cases. By occupying the mind with a constant checklist, you give the body a signal that it is never an option and therefore not felt. The second benefit of this type of mental toughness is that form and ability are maintained for much longer than if you wanted to finish a 100-mile leading to greater, overtaking economy (which I can never mention) and decreased chance of a catastrophic fall.

149. I would define mental toughness as if you start spinning, you can do it! WE WERE 2. The ability to train day after day after day. I have chronic illnesses so it's really important for me to be consistent and try hard. Mental toughness is coming into the finish line in last place, knowing that the finish line is being cleaned up, prizes and food, fatigue gone and nearly every one has gone home but not quitting. Things will get better eventually and to keep putting one foot in front of the other rather than stopping out or giving up as the ability to maintain a steady pace despite complaints from your body.

150. I would define mental toughness in relation to ultra-marathon running as the ability to realize that you have given your all, that you are tired, that you don't have anything left, and to still keep going to the finish line. There comes a point when you have to overcome your negative thoughts and fears and just continue. The ability to mentally overcome any obstacle that would stop the average person, whether it

the race

192. Mental toughness - how you respond when your physical condition is starting to be compromised. At twenty five miles you are tired, you start to cramp, you get thirsty and hungry, you start thinking about getting hurt, doubt starts to creep in which leads to excuses (not real reasons) for stopping. Mental toughness allows you to overcome those thoughts or not even have them.
193. Mental toughness - not letting anything break you down, whether it's an environmental factor or internal factor. Things like rain, snow, wind, fog, water crossings, rocky terrain, mountain lion sightings, (or mountain sightings, haha) knew I could probably finish, but it would take me much longer than I had planned on and simply didn't want to continue. Luckily I was convinced that I would always regret it and that I was still capable of continuing and I did and finished. My mental toughness initially failed me then but that experience I think strengthened me for the long run and I'm going back this year to give the MMT 100 another go.
194. Mental toughness - the ability to set aside physical discomfort and on some days, avoid dwelling on "why the heck am I doing this" because you KNOW how good you feel when you accomplish the day's run.
195. Mental toughness boils down to the ability to deal with the length of the race, and the pain that comes at different points and in different ways throughout the race. Since it has been a few years since doing my last 100 miler I sometimes wonder if I could mentally gear back up to do the training necessary to mentally prepare to cover the distance. I think the mental preparation is probably more important than the physical. But the mental toughness takes time to build up in order to eventually do the race. "Also, at least for me, the immediate pain of the race goes away. I compare it to the pain of child birth, in that, there is an amnesia affect that somehow your mind allows you to forget the pain and desire to do it again.
196. Mental toughness in ultra marathon running is to keep going even if every part in your screams to stop and to remain a positive, happy attitude in times where you fall your deepest.
197. Mental Toughness in ultramarathons is all about dealing with pain and monotony. It's much more of a mental battle than physical. How fast you are running, if when you walk, and your confidence in finishing the race are all linked to how tough you are. I think ultra runners enjoy that mental battle. Even exhausted or not relevant. Virtually everyone has the physical ability to train for and complete an ultra or a marathon event. But the mind keeps us from your own is not exactly fun, but you do it because you know the 50 mile race will be much easier.
198. Mental toughness in ultramarathons to me is being able to persevere through the pain and suffering of the event. I realized early on that no course is the same as another even on the same course from year to year. There will always be a degree of the unknown for any event so how you respond to each challenge and obstacle defines mental toughness. To me, it's all about digging deep within, moving forward towards a goal and I persist despite the ease or attractiveness of stopping and pulling out that inner strength no matter how tough the course is or how much misery we are suffering. Quitting is not an option for me unless I had a catastrophic breakdown and finishing becomes impossible. I don't beat myself up little if any mental toughness to keep moving. The start of a race when it is cold and dark and my plantar fasciitis is flaring requires more mental toughness. Thirty miles into a race and I'm feeling good requires some mental toughness, but 30 continue to move forward, one step at a time, even when your body and mind are

208. **Mental toughness** is relentless forward motion in the face of pain and suffering. Mental toughness in ultramarathons=the ability to go beyond physical discomfort, pain and endurance and the mind using psychological great feeling.

219. **Mental toughness** is respect to ultramarathons means ignoring the signals your body is sending you that you are too exhausted to go on for 24 events. Means making a conscious decision to keep moving forward through every part of your body is crying out to stop. It is trusting that your body is ABLE to continue well. Mental toughness is a necessary state of resilient thinking in response to negative physical or emotional feelings when running an ultra distance event.

220. **Mental toughness** is setting aside any pain or other negative thoughts and focusing on what you need to do to get to the next aid station or finish line. Mental toughness is simply about not stopping when something is difficult. Mental toughness is about not stopping what you are doing and just shut down. Toughness isn't about how fast you can go or how hard you can push - that comes down to ability and training. Toughness is continuing forward when things are difficult and it would be easier to stop. Toughness can be relative to other people, but also somewhat related to ability. For the average person walking 10 feet you can't walk. Walking a mile isn't so hard. But walking 10 miles might be tough. Most people could do it if they simply didn't stop as long as possible. Knowing it's difficult is similar with runners. Running a marathon is simply about not stopping no matter how much you may want to. The speed you do it at is based on ability and training, but completing the race is based on continuing forward even when you're tired and you want to stop. That ability to not stop when it's difficult is there to a greater degree for people who complete longer distance races because a lot more time is spent in difficult circumstances and more opportunities to just stop. When I say toughness is related to ability, I'm thinking of someone who is coming through strenuous physical rehab someone who isn't supposed to walk again after an accident. That person walks and goes in tough because they didn't stop doing something that was difficult. When physical abilities are severely limited due to an injury, then the toughness that it takes to complete smaller tasks has to be there because they are more difficult.

222. **Mental toughness** is simply being able to recognize that any pain one is experiencing in a given moment is transitory and will most likely be no more and the repetition of the next stride or the next stroke or the next climb is hard enough to avoid injury. Mental toughness is simply perse and enduring through adversity, whether it be weather, fatigue, hypothermia or other problems.

224. **Mental toughness** is the ability of the mind to maintain focus on the goal (i.e. completing the race) despite distractions such as fatigue, pain, adverse weather conditions, dehydration, and tough trail terrain.

225. **Mental toughness** is the ability to continue on regardless of pain, fatigue, or boredom. The ability to block out all feelings unpleasant in order to attain one's goal. Once you start you do not quit until with objective is completed. One must embrace the adversity as a part of the process - cramps, blisters, or other injuries in completing it.

226. **Mental toughness** is the ability to continue on when every fiber in your body is screaming quit on you but your spirit body starts you to get through the pain and finish what you started. There is ALWAYS more gas in the tank. Knowing that allows you to catch and pass me in the race every time when your body wants to stop.

218. **Mental toughness** is the forward motion in the face of pain and

means making sacrifices, putting in lots of late nights at work so that I can have mornings off to run, etc., and going out on a long training run even if I can't find a buddy to head out on the trail with me. That requires every bit as much mental toughness as logging through 100 miles of mud on race day; it's just deployed a bit differently for me is coming to an understanding with myself in the depths of my uncomfot. I agreed to do this, which means I agreed to see this through.

281. No whining and no sniveling

282. Not crying like a baby.

283. Not giving up when hurt; finishing the race or doing the best you can despite adverse conditions of the mind that would have you stop running. From Marshall

284. Not quitting before you are... you've got you are hurting, tired, miserable and you just keep going because you came there to finish the race (several)

285. Not quitting when common sense says quit. Kren means despite leg soreness, there is grunting, etc. is that through the pain... then you learn how to distinguish general soreness from acute pain that may be an oncoming injury.

286. Learning how to manage pain.

287. Not stopping even when I've cussed stubbornness is what keeps me going in races when I'm tired than I ever thought possible and everything hurts and this you want to make it and you're slow, this is taking so long why don't you just

288. Telling those inner voices to quiet. Using mantras effectively. I like hills as a friend. I was a death march and it took me almost 15 hours to

289. Not sure what to do about a tough race. I've cussed stubbornness is what keeps me going in races when I'm tired than I ever thought possible and everything hurts and this you want to make it and you're slow, this is taking so long why don't you just

290. Not very tough especially compared to others. I can't go beyond 100 what they will endure. However on the Rocky Chucky 50k I twisted my ankle after only 20

291. Not sure what to do about a tough race. I've cussed stubbornness is what keeps me going in races when I'm tired than I ever thought possible and everything hurts and this you want to make it and you're slow, this is taking so long why don't you just

292. Mentally toughest challenge is dealing with the pain which I find is the biggest catalyst for the fastest negative thought. Once you understand that cause and effect relationship and come up with some coping strategies to deal with the

293. Pain as much becomes a matter of practice and understanding what pain is associated with serious injury and what can be ignored/tolerated. It's really just another form of conditioning.

294. Only ability (DNF) for 4 reasons: 1) mental deadness 2) broken bone which prevents prepared 3) can't keep fluids/food to achieve any/all goals 4) can't maintain body temp high or low, my thoughts and my actions to understand that I will

295. Overcoming lack of natural running "talent" (very slow), hanging on despite obstacles/pain/setbacks, learning from failures/dnfs how to succeed.

296. Managing to keep going when all you want to do is stop block out negative

297. Overcoming pain or exhaustion, lack of confidence is immensely physically stressful. Overcoming physical and mental fatigue. (There is much described "heads" in place that we often rush mentally to give up. So we're out only because of thoughts and beliefs about mental ability. These are things that often much tougher to overcome than a physical pain. Those who can continue in spite of these things usually prevail.

298. Overcoming thoughts of quitting, failure or inability to complete a given task. To me, when I am told I am virtually incapable of running, the pain is serious enough to stop due to serious injury or if it is fatigue manifesting through pain. I wouldn't quit

299. Never ever giving up. This is despite adverse weather conditions,

300. Never ever giving up. This is despite adverse weather conditions,

301. Never ever giving up. This is despite adverse weather conditions,

302. Never ever giving up. This is despite adverse weather conditions,

303. Never ever giving up. This is despite adverse weather conditions,

304. Never ever giving up. This is despite adverse weather conditions,

305. Never ever giving up. This is despite adverse weather conditions,

294. Quiet cognis got levghpa inf is utting, fair ju Need itabiarity to foins plere ghan
 askit felfh Sinc Chahly ouy gh die bast d'cifi fings if the pa int is a sedicou pmed ghft' stop
 du6. to Quiet in jnsmo an of isof at lguen mtraife foing th rogh tryng to do d'nt best. I
 antispate the pjured orum d'angeh it knowing it is only temporary. The better
 295. ned Over, the legs p'ant. yof th mighnt h'edois emp'asiale, by takel ist bareng ad that to
 h'ed f'ed g'ailha takeep stoppeg you est quitthent l'g'ere sevepevas soots as lly can re'ally
 mantably f'obes adson it h'end ag'ost wh'udnis f'ox am'ple withy in firsty 100k this year
 happen (PR). fall on the first hot and humid day we'd had. It was 70 degrees at 5
 am. It was des'cribal, distah desperately wanted to stop sunning. The h'es mile can to h'a
 ma'co g'ast r'equ'ire no'ing r'ough h'ards, s'ov' l'ld'ignes set'ed h'upt and o'v'ca' h'as' m'ade A' d'of
 ph'ys'icad, ext'ens'on l'nd h' d'fa'ed of any th'p'ain) th' just kept m'ac'ing. The v' d'fference in
 296. ultra r'ait has some p'ain'ye'us' equ'ire d'iv'ed o'f h'ca' use'ul t'ep'ain'ner wh'ile' not quite as
 im'hat'et' it' ex'p'ier'enc'ed ph'ys'ic' al' m'g' b'it' in (equ'it'ail'oh' j'ury)

298. Regarding mental to things, g'ab' d' (fatig'ure, h'os'c'ou'p' r'ese'm'ally, w'om'it'ia'g's
 not h'es's) ughest thing I've ever done.

299. Re's'e's's' forward motion, aid station to aid station, through the ups and
 299. ns f'eh'ave' r'ace. Most of in'g' o'ur' m'ed'et' f'reat, (h'od' g'ont' h'not' equ'it'ing' o'f' some
 s'm'ary' th'ing' l'ere, e'p'ut' h'es' p'ain' w'is' p'ec'if'ic'ly' wh'een' l'it' h'od'ay' s'ig'nal's (l'it' h'et' h'ham' f'ish'ing)
 t'w' g'it' h'ead' y'equ'it' o'f' s'each' g'oad's' m'ed'g'at' to'ug' h' stop'ing' r'and' d'rop'ing' d'f'rom' the race
 300. en it'is' p'ro'vid'ing' o'f' s'p'it' h' d' h'ys'ic' M'ost' i' n'fat'ig'ue' r'ex'haust' k'ee'p' s'elf' d'at' h' s'p'and' of
 h'as't' h'ought's' e's' d' e'p'ait'ing' is probably harder than pushing through the pain, if
 301. wa' p'et' s'ek' w'ing' h'et'ent' h'ings' i'nev'it'ably' b'eg' i' n' to get more and more difficult
 302. in R'ech'et' d' s'allo'ng' w'ith' p'ro'g'ess' (a' b'us' e'd' a' t'if' l'uo' n'ang' o'f' h' h'at's' o'ar' n' d'ler
 302. e I h'es' s'ial' d' h'ing's' a' d'ie'f'ic'ac' t'ask' w'ay' d' g'et' h'ing's' to' "the' n'ad' t'ag'ard' h'as' e' s' i' n'ental
 fat'ig'ue' i' n' d' t'g' i' n' g' f'p' w'ar' h' w' h' e' t' h' e' s' a' l' l' e' n' g' m' i' l' d' o' s' e' a' (b' u' s' n' p' a' i' n' s' o' n' i' g' o' r' i' e' s'
 ph'ys'ic' al' i' n' j' u' r' y) o' p.

303. Re's'ist'less' f'or' w'and' s'p'ro'g'ets' o'k' a' q'is'ig'et' o'is't'op' h' h'ar'it' s' t'ru'it' d' y' h'it' (h'g't' to
 k'el' b' y' o'ng' s'elf' h' o' t' c'c' s' t' o' p' i' n' i' s' h' e' g' at' M'iwok, I got to the key cut off aid station (Pan
 304. I t'h'ink' h'oo' t'g' m' h'es' p'ain' A' l'let' y' n' G'ott' e' n' g' h' e' n' l' e' a' g' e' a' h' i' r' d' l' e' h' d' o' n' t' h' e' r' a' i' n' y' w' a' s' g'
 s'ho'p't' y' o' a' d' o' n' h' i' l' l' t' o' t' h' e' o' c' e' a' n' . T' h' a' t' h' u' r' t' b' e' c' a' u' s' e' I' d' b' e' e' n' g' o' i' n' g' f' o' r' 80k' m' o' r' s' o'
 305. I j'ust' s'p' i' n' g' o' n' s' e' k' h' e' r' o' t' h' i' n' g' s' o' e' n' t' h' a' d' , h' i' l' a' k' i' n' g' w' i' n' g' i' t' a' e' d' , w' a' s' a' h' g' o' o' d' m' y'
 t' h' e' s' h' a' d' g' o' d' e' r' d' u' e' s' s' ,

308. Re's'ist'less' s' h' k' e' p' g' i' s' c' o' m' f' o' r' t' and h' o' r' d' t' h' o' u' g' h' p' u' t' d' e' g' r' e' e' o' f' i' n' f' r' o' n' t' o' f'
 t' h' e' d' i' f' f' e' r' e' n' c' e' / a' c' c' u' i' t' y' t' o' r' e' a' l' i' z' e' h' o' w' m' u' c' h' t' o' N' O' T' p' u' s' h' i' t' , s' o' t' h' e' t' o' u' g' h' n' e' s' s' t' o'
 307. c'is' p' s' h' i' n' g' e' s' t' r' a' i' n' t' h' a' s' o' n' e' p' l' e' t' e' e' x' h' a' u' s' t' i' o' n' a' n' d' p' h' y' s' i' c' a' l' p' a' i' n' . T' r' a' i' n' i' n' g' i' n' e' v' e' r' y'
 307. d' o' f' R' e' m' a' i' n' i' n' g' f' o' r' e' s' t' o' n' e' t' h' e' t' a' s' k' a' t' h' a' n' d' a' n' d' d' e' s' p' i' t' e' o' b' s' t' a' c' l' e' s' t' h' a' t' m' a' y'
 308. s'ent' p' u' s' h' i' n' g' t' h' e' r' o' u' g' h' w' a' t' e' r' p' a' i' n' d' a' n' d' p' h' y' s' i' c' a' l' c' o' n' d' i' t' i' o' n' s' a' n' y' t' h' i' n' g' i' t' t' a' k' e' s'
 304. e' a' c' h' r' e' s' i' l' i' e' n' c' e' , a' d' a' p' a' b' i' l' i' t' y' , c' o' m' m' i' t' m' e' n' t' , g' o' a' l' d' r' i' v' e' n' , t' h' e' a' b' i' l' i' t' y' t' o' a' s' k' f' o' r' a' n' d'
 309. p' t' a' s' s' i' s' t' a' n' c' e' t' h' r' o' u' g' h' p' h' y' s' i' c' a' l' a' w' a' r' e' n' e' s' s' , o' p' o' l' y' e' a' w' a' r' e' n' e' s' s' , a' g' o' - l' e' s' s' . F' o' r' m' e'
 310. a' n' i' n' c' h' i' l' d' t' h' a' t' g' l' o' p' i' e' s' p' e' r' s' e' v' e' r' i' n' g' d' a' t' a' h' e' d' i' n' g' i' v' i' g' l' y' a' w' a' r' s' h' i' n' g' e' a' c' h'
 p' r' e' s' e' r' v' a' n' t' d' i' s' p' i' t' e' t' h' e' m' e' n' t' a' l' a' n' d' p' h' y' s' i' c' a' l' d' i' s' a' b' i' l' i' t' y' t' o' m' a' k' e' a' c' h' o' i' c' e' o' r'
 a' d' j' u' s' t' m' e' n' t' s' h' i' l' t' s' t' h' r' o' u' g' h' o' p' e' r' i' e' n' c' e' d' a' d' d' e' n' s' i' t' y' , h' e' a' t' , e' d' i' e' t' h' e' r' a' w' i' n' d' , p' a' i' n' a' t' t' a' c' k' o' f' f' u' e' l' .
 311. e' r' i' n' g' u' s' i' n' g' t' h' r' o' u' g' h' t' o' t' h' e' p' a' i' n' w' h' e' n' i' s' a' s' i' g' n' a' t' i' o' n' t' o' s' t' o' p' p' a' i' n' g' i' t' . H' a' c' i' n' g' e' t' h' a' t' i' s'
 c' h' a' l' l' e' n' g' e' f' o' r' t' h' e' s' a' k' e' o' f' s' p' a' c' e' a' f' f' e' a' r' o' d' y' e' a' r' s' i' n' m' y' y' o' u' n' g' e' r' d' a' y' s' a' s' a' 10 k' m'
 312. n' e' r' . P' a' s' i' n' g' t' h' e' s' a' v' e' h' a' y' h' e' a' r' s' t' b' r' e' a' k' s' a' n' d' s' o' u' a' t' e' d' ' t' w' a' n' t' i' n' g' a' g' a' i' n' . W' h' e' n' s' t' a' r' t' e' d' I'
 N' o' t' e' d' a' n' i' n' g' t' h' o' o' g' o' n' a' l' t' h' o' s' e' a' w' a' y' o' f' o' u' r' m' e' n' t' a' l' t' h' a' t' i' s' t' r' u'k' t' s' a' n' d' o' b' l' o' c' k' s' u' l' d' b' e' a' b' i' l' i' t' y'
 b' e' a' t' .

438. ~~Other Road races and ultramarathons which do not have a time limit and that is what I am talking about. Progression needs to be taken over your thoughts. In order to complete the race you need to be mentally tough because there are times when everything hurts and your body is screaming at you to stop, but your mind has to be tougher. You need to play mental games in order to convince yourself that you are fine and you will be able to make it. When I completed my 100 mile race I felt very sick about mile 23. It was hot and I was getting passed by several runners.~~
 439. The simplest way to say how I felt during the Highland Fling was that I was never going to stop, no matter how hard or painful it got, and for me it was very hard and very painful. To me mental toughness is both the ability to get up every morning and train, and the attitude of never quitting.
 440. The will not to surrender and quit. The will to push through adversity. Anyone can do 2 miles.
 441. The will to go beyond what another person will or can; the willingness to go beyond what I think I am able to do.
 442. The willingness and ability to disregard discomfort and fatigue while remaining focused on making forward movement. Having run only one 50k (not organized) and 2 marathons prior to my 50 mile ultramarathon, my goal was just to finish without injury. My ultramarathon finish time was 10:40, about 9 or 10 people from the back of the pack. The first 25 miles of my ultra were relatively easy, and the last 25 miles became progressively more mentally difficult. The route I ran was 8 loops of 10k, and every time I passed the start/finish line it was more difficult knowing that I would be right back to the same spot in another 70 minutes or so.
 443. The willingness to complete the distance knowing that it will be challenging.
 444. The willingness to do what your peers would not.
 445. The willingness to overcome the perception that you can't complete such an arduous task, the fatigue and pain.
 446. The words "I can't make it" do not exist. Run, walk or crawl "I Will Finish". I never let negative thoughts ever enter my mind. I idea of quitting is not an option. For training I train with friends, lots of them. For the company, but for the race I run "For Me!"
 447. There are many aches and pains, not just associated with the actual event, but in training also. I don't feel the normal everyday person can withstand this pain. When I ran the Mother Road and made 75 Miles I ran over 25 Miles with huge golf ball sized blisters on the balls of my feet. The pain was so intense, Not that will allow you to succeed in whatever challenges face you. I personally have found through ultras that I am a "mentally tough" individual and it had given me great confidence in other areas of my life. At times when things seem really hard I can think of a moment in a race when all things were going bad but I was able to keep moving forward.
 448. There are several low points while running an ultra marathon and that is where mental toughness needs to be there and take over your thoughts. In order to complete the race you need to be mentally tough because there are times when everything hurts and your body is screaming at you to stop, but your mind has to be tougher. You need to play mental games in order to convince yourself that you are fine and you will be able to make it. When I completed my 100 mile race I felt very sick about mile 23. It was hot and I was getting passed by several runners.
 449. To me, mental toughness in the context of ultramarathon running, is the ability to continue forward progression despite a strong physical and mental push all of the negative thoughts away and focus on just getting to the next aid station.

468. When I do ultra markey with the whole what it is being ready for miss My first that tra need the Co in the 100 mile tra Plus, push, fast how the vasing change all of aching the body On for the brand, here I do is gain in it for on that point trail time like the longest of just being only a 87 and a traffic. Myse and a tow gl ne just being duth the mer strength to gl one the alme lace me Pas in inogitabar, being at tag live stop thises you through joy as the other phantial diffjerent. Or getting last. What al to bghness in pain being fol up ad ing a fice ad ow in go onn self vort basy call self asked the beauty somecudng lying foot in the rouest wotry hurt so is joly"le Wofic lo ing plied, M'Wd are toughnes in treat and the this disciplined rednough so" that's mental toughness had stored kicked in my or drink insufficiently so as to cause fatigue or mental bonking. Mental toughness means being alert and self aware to know when you do need to refuel, rest, and listen to others providing insightful help on your running condition. Mental toughness means that you know that you alone are responsible for getting yourself to the finish line. So, to recap, mental toughness is developing a hypnotic state of focus and motivation. Also, you need the mental toughness to recognize that meditative state is necessary to transcend any pain that might stop or deter the normal runner.

469. When it comes to ultra running, you have to not let the 'bad' parts of the race get you down. There's going to be places where you don't feel well, and you hurt, and you would really like to stop. But you have to be mentally strong enough to get through these parts. You have to be stronger than every muscle in your body, or every nagging injury telling you to stop.

470. When people are hurting (non-ultra runners), they just have no idea what "hurt" is. That makes me tough.

471. When your body fails to physically respond the way you need/want you rely on mental capabilities to keep going

472. With respect to ultramarathon running I really have to go with "mental toughness is learning how to condition your mind to think confidently and be able to overcome frustration/self-critical negativity (reframe self-talk into what it is you want to occur)" Ultrarunning is just such a solitary sport and even when you are running competitively it is still a fight against weaknesses contained within the self more than anything else. A good example is when I run 100 milers. I am in no way competitive at that distance and they are so mentally and physically exhausting that at some point there is virtually no conceivable reason that I should keep going. At times like this, especially in the depth of night when it's cold and dark and you are alone and aren't able to enjoy the scenery, you are assailed by demons. It takes a huge force of will to overcome and persevere. It gets easier the more times you fight and win this battle but I've met many people who have fought it and lost and they have an ever more difficult time making the comeback. My mantra during the darkest hour is the snippet from the Dylan Thomas poem "Do not go gentle into that good night, rage, rage against the dying of the light!"

473. You don't quite when you want to, you stop when you finish. Being able to out argue the demons of pain is sometimes more important than being physically ready for ultras

474. You have to be willing to push mentally when your legs and body doesn't

APPENDIX D

ONLINE SURVEY BASED ON JONES AND COLLEAGUES' (2007)

CHARACTERISTICS OF MENTAL TOUGHNESS

Survey Based on Attributes of Mental Toughness (Jones et al., 2007)

Directions: Below are statements that represent attributes of an existing definition of mental toughness. Please indicate the extent to which you agree or disagree with the following statements:

*In regards to **attitude/mindset**, mentally tough ultramarathon runners possess and/or exhibit the following characteristics:*

1. An unshakable self-belief and total awareness of how they got to where they are now.

Strongly Agree Agree Neutral Disagree Strongly Disagree

2. An inner arrogance that makes them believe that they can achieve anything they set their mind to.

Strongly Agree Agree Neutral Disagree Strongly Disagree

3. The belief that they can push through any obstacle put in their way.

Strongly Agree Agree Neutral Disagree Strongly Disagree

4. The belief that their desire or hunger will ultimately result in fulfilling their potential.

Strongly Agree Agree Neutral Disagree Strongly Disagree

*In regards to **attitude/mindset**, mentally tough ultramarathon runners possess and/or exhibit the following characteristics:*

5. Refusal to be swayed by short-term gains (financial, performance) that will jeopardize the achievement of long-term goals.

Strongly Agree Agree Neutral Disagree Strongly Disagree

6. Belief that achievement of their running goals is the number one priority in their life.

Strongly Agree Agree Neutral Disagree Strongly Disagree

7. Recognition of the importance of knowing when to switch on and off from ultramarathon running.

Strongly Agree Agree Neutral Disagree Strongly Disagree

Directions: Below are statements that represent attributes of an existing definition of mental toughness. Please indicate the extent to which you agree or disagree with the following statements:

*In regards to **training**, mentally tough ultramarathoners possess and/or exhibit the following characteristics:*

1. When training becomes physically and mentally tough due to obstacles, they keep themselves going by reminding themselves of their goals and aspirations, and why they are putting themselves through this.

Strongly Agree Agree Neutral Disagree Strongly Disagree

2. Have the patience, discipline, and self-control with the required training for each developmental stage to allow themselves to reach their full potential.

Strongly Agree Agree Neutral Disagree Strongly Disagree

3. The ability to remain in control and not controlled.

Strongly Agree Agree Neutral Disagree Strongly Disagree

*In regards to **training**, mentally tough ultramarathoners possess and/or exhibit the following characteristics:*

4. The ability to use all aspects of a very difficult training environment to their advantage.

Strongly Agree Agree Neutral Disagree Strongly Disagree

5. Have a love for the aspects of training that hurt.

Strongly Agree Agree Neutral Disagree Strongly Disagree

6. Thrive on opportunities to beat other people in training.

Strongly Agree Agree Neutral Disagree Strongly Disagree

Directions: Below are statements that represent attributes of an existing definition of mental toughness. Please indicate the extent to which you agree or disagree with the following statements:

*In regards to **competition/racing**, mentally tough ultramarathon runners possess/exhibit the following characteristics:*

1. Love the pressure of competition.

Strongly Agree Agree Neutral Disagree Strongly Disagree

2. Adapt to and cope with any change/distraction/threat under pressure.

Strongly Agree Agree Neutral Disagree Strongly Disagree

3. Can make the correct decisions and choose the right options that secure optimal performance under conditions of extreme pressure and ambiguity.

Strongly Agree Agree Neutral Disagree Strongly Disagree

4. Can cope with and channel anxiety in pressure situations.

Strongly Agree Agree Neutral Disagree Strongly Disagree

*In regards to **competition/racing**, mentally tough ultramarathon runners possess/exhibit the following characteristics:*

5. Have total commitment to their performance goal until every possible opportunity of success has passed.

Strongly Agree Agree Neutral Disagree Strongly Disagree

6. Are not fazed by making mistakes, and can come back from them.

Strongly Agree Agree Neutral Disagree Strongly Disagree

7. Possess a killer instinct to capitalize on the moment when they know they can win.

Strongly Agree Agree Neutral Disagree Strongly Disagree

8. Raise their performance “up a gear” when it matters most.

Strongly Agree Agree Neutral Disagree Strongly Disagree

Directions: Below are statements that represent attributes of an existing definition of mental toughness. Please indicate the extent to which you agree or disagree with the following statements:

*In regards to **competition/racing**, mentally tough ultramarathon runners possess/exhibit the following characteristics:*

9. Total focus on the current ultramarathon event in the face of distraction.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
10. The ability to remain committed to a self-absorbed focus despite external distractions.				
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
11. The ability to remain focused on processes and not only on the outcome.				
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
12. Acute awareness of any inappropriate thoughts and feelings and change them to help perform optimally.				
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
13. The ability to use all aspects of a very difficult competition environment to their advantage.				
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Directions: Below are statements that represent attributes of an existing definition of mental toughness. Please indicate the extent to which you agree or disagree with the following statements:

*In regards to **post-competition**, mentally tough ultramarathon runners possess/exhibit the following characteristics:*

1. The ability to recognize and rationalize failure and pick out the learning points to take forward.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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2. The ability to use failure to drive themselves to further success.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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3. The ability to know when to celebrate success and then to stop and focus on the next challenge.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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4. The ability to rationally handle success.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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APPENDIX E

WILLINGNESS TO PARTICIPATE IN FOLLOW UP FORM

Willingness to Participate in Follow-Up Semi-Structured Interview Form

Thank you for participating in the questionnaire phase for this study on mental toughness in ultramarathon runners. In order to further understand perceptions of mental toughness of participants, follow-up interviews will be conducted with individuals who are willing to be potentially contacted for this follow up. There is no assurance or guarantee that you will be selected for the follow-up phase, as participants who consent will be selected to attain a diverse sample.

Interviews will take about 45 minutes and are designed to understand the ultramarathon runners specific experiences and perceptions of mental toughness.

Participants who consent for the follow-up phase need to supply contact information. All contact information provided will be stored separately from other data to ensure anonymity.

1. After reviewing the information above, I:

CONSENT to providing my contact information and consideration for a follow-up interview

DO NOT CONSENT to participating in a follow-up interview.

2. If you selected CONSENT to potentially participate in a follow-up interview, please provide your contact information below:

Name:

Email Address:

Phone Number:

APPENDIX F
PERMISSION TO AUDIOTAPE FORM

Title: Perceptions of mental toughness in ultramarathon runners

Principal Researcher: Michael L. Sachs, Ph.D.

Student Researcher: Anna-Marie C. Jaeschke, B. S.

Temple University- Department of Kinesiology

Participant: _____ Date: _____

Log #: _____

I give Anna-Marie Jaeschke permission to audiotape me. This audiotape will be used onle for the following purpose(s): (Choose one):

RESEARCH

This audiotape will be used as part of a research project at Temple University. I have already given my written consent for my participation in this research project. At no time will my name be used.

WHEN WILL I BE AUDIOTAPED?

I agree to be audiotaped during the time period: March 4th, 2012 to March 12th, 2012

HOW LONG WILL THE TAPES BE USED?

I give permission for these tapes to be used from: February 1st, 2012 to August 31st, 2012
The data that is gathered will be stored for three (3) years after completion of the study.

WHAT IF I CHANGE MY MIND?

I understand that I can withdraw my permission at any time. Upon my request, the audiotape(s) will no longer be used. This will not affect my care or relationship with Anna-Marie Jaeschke in any way.

OTHER

I understand that I will not be paid for being audiotaped or for the use of audiotapes.

FOR FURTHER INFORMATION

If I want more information about the audiotape(s), or if I have questions or concerns at any time, I can contact:

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This form will be placed in my records and a copy will be kept by the person(s) named above. A copy will be given to me.

Title: Perceptions of mental toughness in ultramarathon runners.

Please Print:

Subjects Name:

Date:

Address:

Phone:

Subject's Signature: _____

APPENDIX G
SEMI-STRUCTURED INTERVIEWS
CONSENT FORM

Title: Perceptions of mental toughness in ultramarathon runners.

Principal Researcher: Michael L. Sachs, Department of Kinesiology, 215-204-8718

Student Researcher: Anna-Marie Jaeschke, Department of Kinesiology, 703-314-3962

Dear Ultramarathon Runner,

The purpose of this study is to build understanding of the construct of mental toughness in the sport of ultramarathon running. We hope to examine an existing construct of mental toughness and see the applicable components as related to ultramarathon running. Additionally, we hope to develop a sport-specific definition of mental toughness in ultramarathon running. To help us in this study, we are asking for your participation in the following semi-structured interview, which should take approximately 30 to 45 minutes. Interviews will be conducted in person, via telephone, or via Skype. Participant responses will then be transcribed and sent back to the participant for verification of their responses.

You must be 18 years of age to participate. The information you provide will remain secure. However, note that information sent through the Internet is confidential only to the extent the Internet is secure. Any part of this study that is published or presented will include pseudonyms

There are no known risks or harm associated with participation in this study. Your participation is completely voluntary and you may refuse to participate or stop at any point without consequence.

Consenting participants MUST read, understand, and agree to the following:

I understand I may benefit from participating in this study through learning about my own perceptions and experiences of mental toughness. I understand that I will neither be charged nor paid any fee for participation in this study.

All documents and information relating to this study will be kept confidential, unless required by federal, state, and local laws and regulations to be disclosed. I understand that data in this study may be reviewed by Temple University and its researchers, the main researcher, or the researcher's colleagues (if applicable), and/or university governmental agencies to assure proper conduct of the study and compliance with regulations. I understand this research may be published and, if so, I will not be identified by name.

If I have any questions concerning my rights as a research participant. I may contact the Institutional Review Board Coordinator at IRB@temple.edu or at
Institutional Review Board Coordinator
Temple University Research Administration
Student Faculty Conference Center
3340 N. Broad Street- Suite 304
Philadelphia, PA 19140

By selecting the CONSENT option below. I am indicating that I have read and understand the contents of this consent form.

APPENDIX H
QUESTIONS FOR SEMI-STRUCTURED INTERVIEWS

Questions for Semi-Structured Interviews

The participants will be asked to speak on their general experiences as an ultramarathon runner, follow up probing questions may ensue to facilitate a dialogue.

1. From the first phase of this research project, a question was asked about how you would define mental toughness in ultra running, the definition that emerged was: *Mental toughness is the ability and awareness that allows a runner to persist and push beyond physical, psychological, and environmental limitations for an unconventionally long duration of time in both training and competition.* Do you agree with this definition? Why or why not?
2. What are traits of a mentally tough ultramarathoner?
 - a. What are some examples in your ultramarathon running in which you felt mentally tough?
 - b. What are some situations in which you have witnessed mental toughness, what did it look like?
 - c. What do you think differentiates mentally tough ultramarathoners from those that are not mentally tough?
 - d. When do you feel mental toughness is most important, in training, during an event, or after?
3. Describe what factors, people, or situations have helped you develop your mental toughness?
4. Research shows that some athletes are born with certain aspects or a level of mental toughness, and other studies say it is purely developed, what do you think in this nature vs. nurture debate?
5. Suppose that an ultramarathoner is doing a training run and would like to run 25 miles. As the runner continues, they are just not feeling it that day. They feel tired, achy, and their legs hurt. What does a mentally tough ultramarathoner do?
6. Do you have any additional thoughts on mental toughness that you would like to share?