



## The Sport of Ultra Running: All Trails Lead to the Same Destination

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### Author Note

This research was mentored by Polygence advisor Daphne, supervised by Marc Gray, inspired by Ben Blackmon's father, Bentley Blackmon, and made possible by the Sylamore 50k race director, Greg Eason.

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### Abstract

In the relatively recent sport of ultra running, there is a need for more research on how the minds and bodies of ultra runners work. However, experienced runners, scientists, and uniformed onlookers need to have a wide variety of information available for discovering how the body handles stress, understanding optimal strategies, and learning about this young and overlooked sport. This study aims to inform the general public about ultra running by analyzing runners' experiences to better understand the "why" behind each runner's passion. The survey was given in two parts to a group of willing 50k participants at a race in Arkansas called the Sylamore 50k. One survey was given before the race, asking questions that collected data on the individual's running history, preparation, and motivation for the race. The second survey was given after the race, asking questions about feelings during the race, coping strategies, and the impact running has had on their lives. The replies were then analyzed individually and compared to each other to draw this paper's conclusions. Some small trends needing more research appeared, but one theme stood out. It showed that a runner's background affects how they train and plan; however, no matter the preparation method or amount, after the race, each person had a similar positive spirit. Most highlighted the importance running had on their lives and encouraged non-runners to join. This is an important addition to the literature in this field of study and can help runners, scientists, and viewers alike grasp a greater understanding and appreciation for the sport of ultra running.

*Keywords:* Ultramarathon, ultra running, running, trail running, sport, motivation, psychology, physiology

Ultra running is a sport of physical vigor, toughness, and determination in which racers cover many miles throughout their run. An ultramarathon is classified as any race longer than a 26.2-mile marathon, and ultra running is the act of participating in those events. Running is the base for many athletic events, and its origins date back to the beginning of humankind. Ever since we could run, we have been racing. This evolved from hunting parties before settlements were around to incredible international events such as the Olympics of today. Beginning in the 1960s-1970s, running greatly increased in popularity and not just among professionals. People of all ages participated in various types of running activities, including recreational exercise, local school track meets, and huge international events. This popularity continued to climb, leaving the United States with an estimated 50 million runners (15% of citizens) in 2021, according to Statista, and 621 million runners worldwide. In the broader running community, there is a niche subset of avid and often unnoticed runners pushing themselves beyond normal limits, accomplishing feats very few people would consider possible. They are connected by strong bonds formed from understanding each other's struggles. The sport is ultra running. The reason, or the "why" as runners call it, for participating in ultra running events and the sheer lengths people go to make it happen is astounding for those who aren't familiar. There is much to be learned from this sport because it opens an entirely new set of circumstances where people who voluntarily put their minds and bodies through discomfort can be studied.

Because it is a niche sport, there are far fewer existing studies about exactly what goes on in the mind and body of an ultra runner. A majority of the current research on long-distance running focuses on the marathon population. While this is better than nothing and there are close similarities between the sports, it does not capture the true experiences of the ultra running population. Below are examples of the few ultramarathon race studies focused on understanding these runners.

## Research

Ultra running can bring about many emotions in just one race because of the immense strain placed on the whole body. A study by Holt et al. (2014) showed that when racers' bodies started giving out, feelings of quitting came. However, a large majority of participants coped with this by making small goals, watching their pace, nourishing themselves, and using social support. Also, a predictable contrast appeared between finishers and non-finishers. Racers who did not finish felt disappointment while racers who did finish spoke of the race as being a significant life achievement.

It was found that ultra runners, specifically successful ones, have "higher levels of self-efficacy, mental toughness, emotional intelligence, and lower mood variability" (Thornton et al., 2023). This study focused on the physiological similarities of successful ultramarathoners and specifically which traits made them successful.

A reason for such determination and fortitude might stem from the motivation driving participants to run. In 2015, Hanson et al. documented the correlation between race distance and the corresponding motivation for runners using what is called the Motivation of Marathoners Scale. The scale had nine categories of motivation, but four were the focus: health orientation, weight concern, life meaning, and personal goal achievement. Ultra marathoners had motives more strongly oriented toward life meaning than health or weight motivations when compared to half and full marathoners. On the other hand, marathoners noted more motivation from achieving personal goals than ultra marathoners. Across all the distance runners, ultra

marathoners were more intrinsically driven by personal growth and purpose. They scored higher on psychological and social factors and lower on physical factors.

Another study using participants from a 100-mile race tested how such extreme distance affected the racers' mental stability. The test included a series of digital voice recordings at intervals prompting the runners to assess their mental state, willpower, and perseverance. The results found sixteen themes that can be simplified into four categories that demonstrate the role one's mind has on willpower and perseverance: cognition, attitude, sociality, and affect. Again, there are clinical implications that reach beyond the sport which can "increase insight into how humans endure a range of stressors, both physical and psychological" (Watkins, 2017). The paper states that "the mind in perseverance and willpower is multifaceted" (Watkins, 2017).

In another study, Simpson et al. (2014) sought to capture the experiences of actively training and competing ultra runners of all ages using phenomenological interviews. The findings found five themes using qualitative data: preparation/strategy, management, discovery, personal achievement, and community. These five themes broadly summarize the experiences felt by ultrarunners throughout their training and racing.

Lastly, a study was done on the effects of "hitting the wall" in a marathon. While this study was not focused on ultra runners, many of the same concepts can be applied. "Hitting the wall" is a term used in running to refer to the time at which an athlete experiences physical and/or mental fatigue that makes them want to stop. While researchers don't always use this terminology, Buman et al. documented its effects (2008). When the body runs out of glycogen (sugar), it must switch to burning fats or proteins for energy, which are harder to process. The timing and duration of this discomfort may differ between participants. Marathoners may increase caloric intake, consume electrolytes, and hydrate more frequently to ease physical fatigue. To reduce mental fatigue, having strong willpower and social support aided greatly. The results show that to overcome "hitting the wall," runners may need to use multiple strategies rather than just one.

## **Gaps**

Though research has been done on ultra running, major gaps still need to be filled. These gaps exist because the sport is relatively new and less popular than other sports. A study by Watkins (2017) summarizes the clinical implications best by stating that the research increases "insight into how humans endure a range of stressors" by offering new perspectives and data on a human's willpower. New research in this area may prove useful in better understanding the psychological and physiological effects of severe stress. These research articles all similarly state that more attention needs to be given to the sport of ultra running (Buman et al., 2008; Thornton et al., 2023; Simpson et al., 2014; Watkins, 2017). There is also a gap in understanding between the running and non-running communities. Ultra runners understand difficulties and how to overcome them to complete the race. The reward of a sense of accomplishment is created only through these extreme circumstances. The diverse global network of ultra runners forms bonds through these shared experiences. Others could benefit from learning more about the sport and its benefits.

## **Methodology**

Data was collected on participants' attitudes toward an ultramarathon and their reflections following their participation using two surveys administered through Qualtrics, a survey creation

website for research and business. The first survey was distributed at midnight on February 10, 2024, and the second at midnight on February 18, 2024. There were two forms to ensure that the outcome of the participants' race would not influence their pre-race responses. The objective was to find unbiased answers using both quantitative and qualitative methods to accurately capture the participants' answers. Race director Greg Eason emailed the questionnaire to all race participants before and after the race. Inclusion criteria for survey completion required that participants were registered for the 2024 Sylamore 50k race, were 18 years or older, and spoke English. Of the 130 runners who were signed up for the 50k, 42 people completed the first form, and 26 people completed the second form. The surveys closed seven days after they were sent. This structure allowed participants one week on either side of race day to respond to the questionnaire.

The research study was approved by the Episcopal Collegiate School IRB before the survey was administered. All participants provided consent to participate in the study before completing each survey. No compensation or incentive was provided for participation in the study. Additionally, participants were allowed to withdraw from the survey at any point and were not required to answer every question within each survey. The data reported in the present paper only reflects results from questions that were answered and excludes incompleting or blank responses.

The study itself consisted of two surveys conducted with the theme of pre-race and post-race questions.

### ***Part One***

Part one, the pre-race portion, was broken into "background information" and "before the race" sections. "Background information" includes questions about age, gender, and past running history. As titled in the survey, the "before the race" section asked questions focused more on pre-race motivation, training, coping, and expectations. The purpose of this section was to find what motivates these runners and how they had prepared for this race.

### ***Part Two***

Part two of the study, the post-race portion, was broken into 3 parts: "during the race," "after the race," and "for the director." This part aimed to discover more about the participants' experience in this race and ultra marathoning in general. Questions focused on the body and, most importantly, the mind. "During the race" questions include a basic rundown of what happened with each person during their run. For instance, asking if they finished the race, when they found difficulty, and how they felt after each 10-mile segment. "After the race" includes questions asking what lifted spirits during the race, coping mechanisms, most significant challenges, and most importantly, how this sport has affected the trajectory of these runners' lives. The purpose of this section was to capture the difficulty of the experience and how they coped. Looking at how these racers finished allows comparisons to the previous answers from Part 1, opening up opportunities to find any changes or constants in the data. However, the most important goal of this section was to capture how and why running is such a dominant part of each runner's life and why others should share in that experience.

## Four Primary Questions

The four primary questions in the post-race portion of the study are as follows:

- A. What did you discover about yourself during the 2024 Sylamore 50k?
- B. How has ultra running changed your life?
- C. What lessons can ultra running teach others?
- D. Do you recommend this sport to people, why?

For question A, the study tried to determine if runners had learned anything new about their psychological or physiological limits during the race. The other three questions target a bigger picture. They capture how running has changed these people's lives and how they might want to share this opportunity with others.

## Director Questions

Lastly, the "for the director" section allowed participants to recommend changes, report problems with the course, and share positive moments they had. Although these questions are not material to the study, they allowed me to assist in improving Mr. Eason's race.

## Results

The results will be divided into four specified categories for each survey. This will organize the data for easier and better comparisons.

<b>Participant Characteristics</b>	<b>Mean /- SD</b>
Age During Race	43 +/- 10.60
Age during first ultramarathon	36.70 +/- 8.72
Previous Ultramarathons completed	15.66 +/- 20.20
Longest Ultramarathon participation (miles)	63 +/- 32.10

### **Part One**

In the first survey, 43 people submitted usable data fitting the criteria, of which 59.52% were male and 40.48% were female. See Figures 1-5 for participants' prior ultramarathon experience.

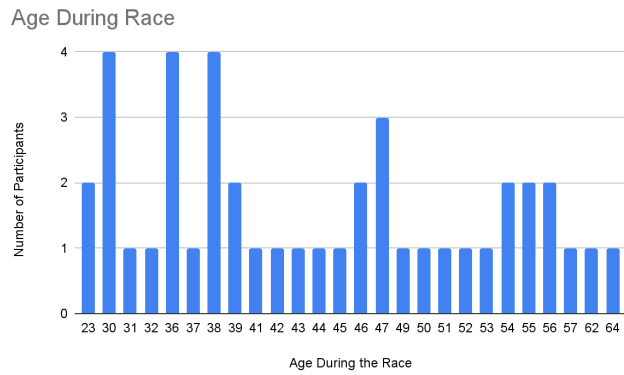


Figure 1. Age During Race

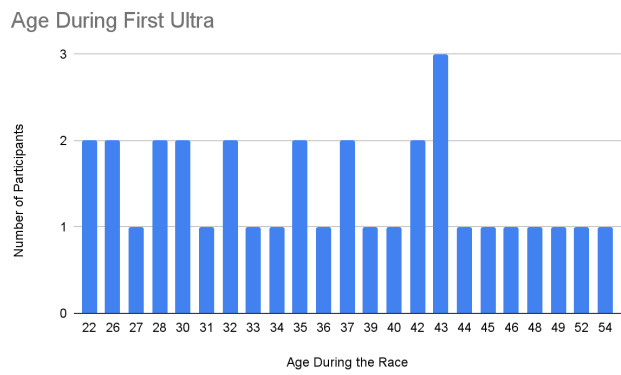


Figure 2. Age During First Ultra

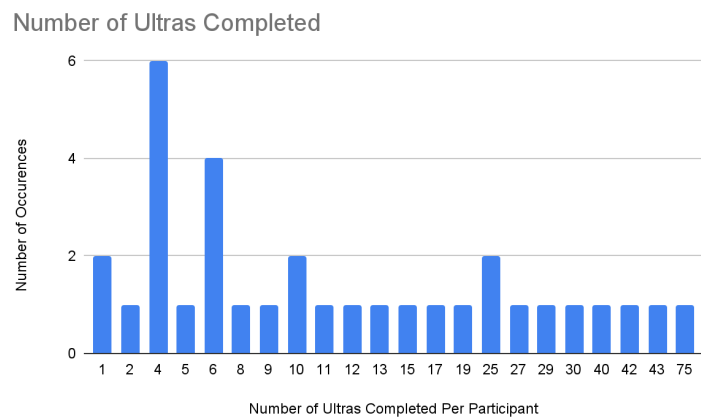


Figure 3. Number of Ultras Completed

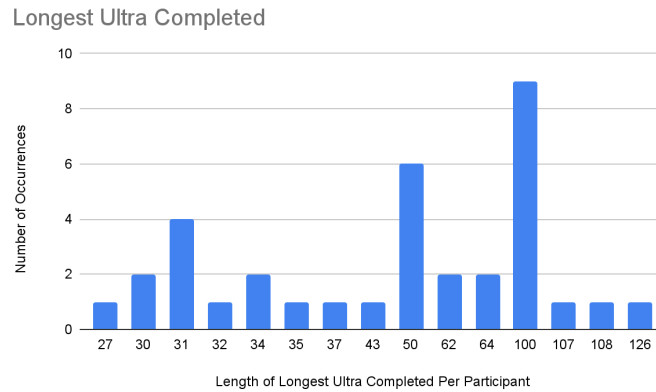


Figure 4. Longest Ultra Completed

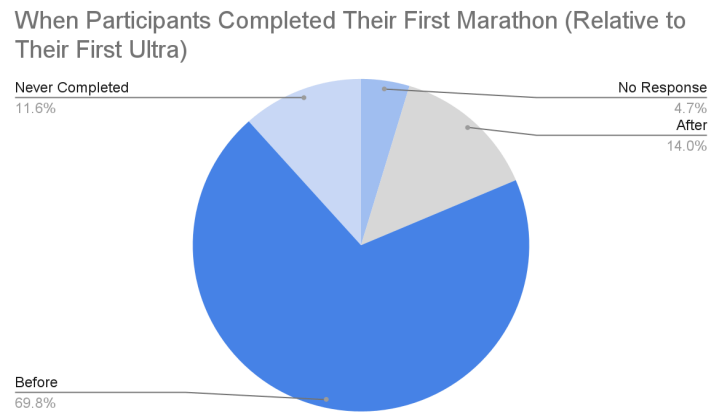


Figure 5. When Participants Completed Their First Marathon (Relative to Their First Ultra)

Each runner's method for training varied in style and length, honed by what worked best for them. The most common source for developing training and race plans was the self-experience of the runners themselves. Tied for second were coaches, the internet, and having no plan at all. See Figure 6.

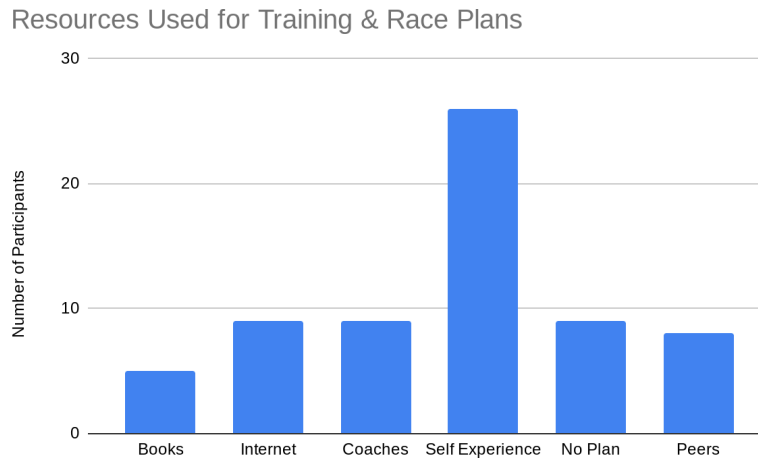


Figure 6. Resources used for Training and Race Plans

Participants consistently used a combination of 2 or 3 training strategies. The top three preferred training options were long runs, hill work, and strength training. Lastly, on mental training, results showed that these runners relied on a variety of strategies to overcome negative feelings. The answers were inconsistent with the runners noting multiple strategies that they used. However, self-talk and embracing the pain and suffering were the most common.

Runners were told to imagine all of the challenges they might face and select which ones they expected to be the hardest physically and mentally. Most of the physical concerns were what one might expect: problems with cramping, muscular fatigue, and recovery from recent injuries. Other physical concerns were weather, the trail technicality, and a lack of sufficient training or recovery.

Participants worried before races about how their mental strength would hold up during the event. For this set of runners, they expected that staying positive would be difficult. Similarly, participants were also concerned about the potential of feeling disappointment. It is common to have post-race regret, feeling that they could have performed better or run faster. Lots of preparation goes into these events to prevent these negative feelings. Many feel stressed about the sheer length of the race and the amount of time they will be running. Some express worries that with fatigue, they will fail to execute their race strategy, costing them time and energy later in the race. A few people noted an additional concern that their personal issues might degrade their mental strength and hinder their ability. Similarly, people worry that loneliness during the race might and that not having someone to draw support from might impact their outcome.

The last and most important category in the first survey is the motivation category. The first question asked what motivated the participants to begin ultra running. Next, the survey asked why they continued running even when their motivation level was at a low. From the sample taken, the first question's answers can be broken down into 7 themes that include motivations for all runners in general: challenge, social, health, enjoyment, exploration, COVID-19, and charity, in that order.

A majority were motivated by a challenge. People want goals to work towards, something that causes them to push beyond their comfort level. The next most common theme was social, with participants being uplifted by interaction with others who shared the same passion. As one



might expect, health benefits were high on the list. Surprisingly, of the people who noted this as a motivation, several just wanted to look good. Others were motivated by a sense of adventure, exploration, trying something new, and the euphoric feeling of fluidly navigating trails. Two people mentioned the pandemic as the reason they started running ultramarathons. One person runs for children with terminal cancer for the charity “Praying Ninja Warrior.”

The second question was used to determine what motivates participants during the race when they struggle physically and emotionally. The most common response was the feeling of success post-race. Beyond that response, there was no consistent answer. These included social, self-encouragement, goal completion, enjoyment, discipline, charity, physical benefits, and mental benefits.

### Part Two

For the second survey, 27 people submitted usable data fitting the criteria with all but one person completing the race. Responses show when racers encountered the “wall”, as discussed earlier (Buman et al., 2008), and how the racers felt through three different stages of the race. See Figures 7-8.

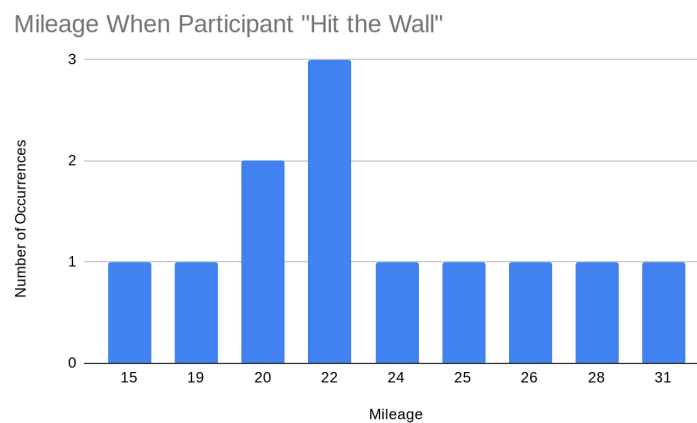


Figure 7. Mileage When Participants “Hit the Wall”

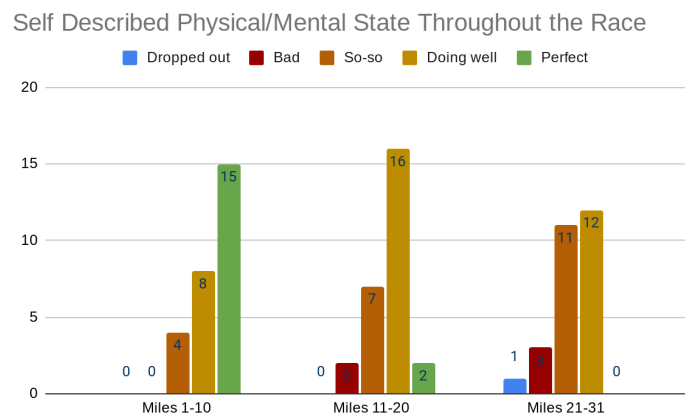


Figure 8. Self-Described Physical & Mental State Throughout the Race

When racers' energy eventually depletes, a common source of new energy is from the community itself. Of the 5 choices of community encouragement (other runners, everyone, no one, personal community, and volunteers), there was a tie between personal community and everyone. Race comradery was very helpful to 72% of the participants with only 4% finding it not very helpful. This group can be broken down into social groups of runners, family, or friends attending together. It shows how much having the support of a team means to these runners. See Figures 8-9.

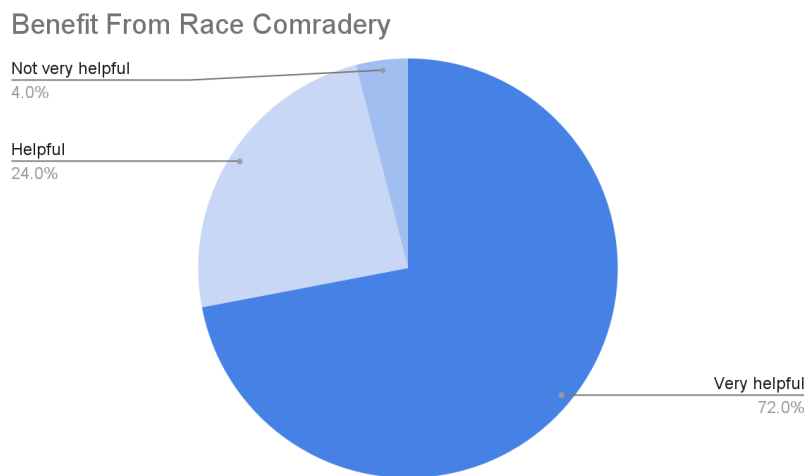


Figure 9. Benefit From Race Comradery

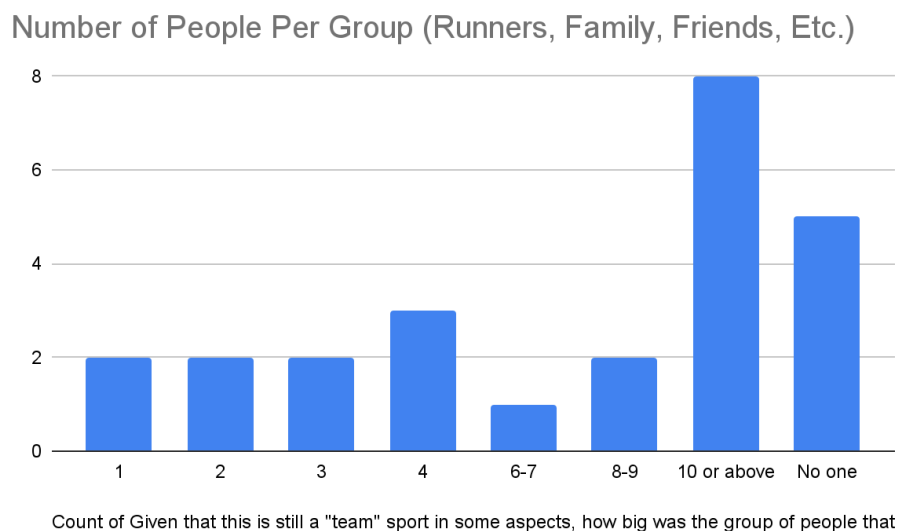


Figure 10. Number of People Per Group (Runners, Family, Friends, Etc.)

While under strenuous activity, coping mechanisms have to be employed to manage the difficulties. By far the most commonly used strategy was self-talk which included coaching, mantras, and reminding themselves that they can't quit. One person mentioned talking to other runners for support. Focus also played a huge role as runners would focus on breathing, strategy, and positive thoughts and feelings.

The next question focuses on how the racers overcame their biggest mental challenge during the race. Again, similar answers arose. Lots of people tried to stay positive and be proud of just attempting the feat while others used themselves and others as support. Other responses included focusing on body movements, pacing, scheduled walking breaks, breaking down the race into smaller segments, and simply continuing to move forward.

Similar to the challenge theme of questions in the first survey, it is repeated here by asking what their biggest mental and physical challenges were during the race. The runners noted that lack of focus increased their chances of injury due to bad foot placement on a trail with rough terrain. While pain can be physically problematic, it can also negatively impact mental strength. So whether it was joint pain, rolled ankles, or the extremely cold temperatures, it affected their mental resilience. Loneliness, hopelessness, and questions of why one agreed to a race of that distance all have an impact.

Physical problems largely were attributed to body pain and discomfort or challenges related to the trail's difficulty. Two people stated that they were not fit enough which contributed to their fatigue. Body-based challenges like joint and muscle pain from overuse are what one might expect. However, injuries from the terrain due to bad foot placement were a major issue. Low energy levels caused by a lack of sufficient nutrients were a common issue too.

The most important section of the second survey was about the sport's impact on the runners' lives. With answers coming from the four big questions in the methodology section, similarities arose. Again, it was a free response so everyone had unique answers, but overall, most said they experienced personal growth. On the contrary, a few said they discovered weaknesses. Many gave examples of how participating in this sport had positively shaped them as they were able to take race experiences and apply them to their personal lives. Interestingly, 100% of people recommended that everyone try this sport because of how personally impactful it had been for them. At the very least, they encouraged others to discover something that pushes their perceived limits.

For the series of questions asking how runners would continue their running lifestyle, an impressive 100% of responders said they would or have already signed up for another race. Most said they anticipate their desire to stay the same or even increase over time. See Figures 11 and 12.

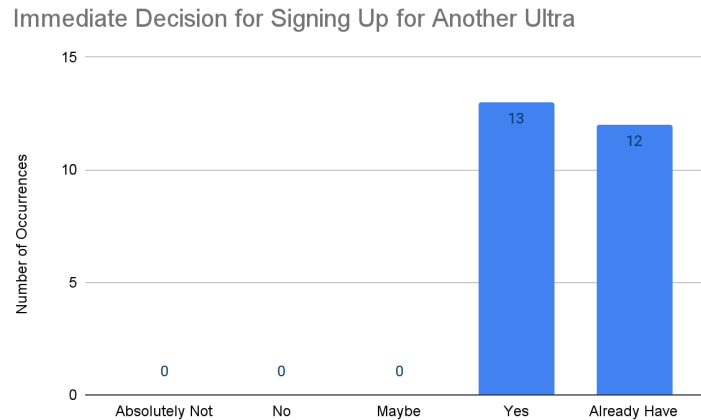


Figure 11. Immediate Decision for Signing Up for Another Ultra

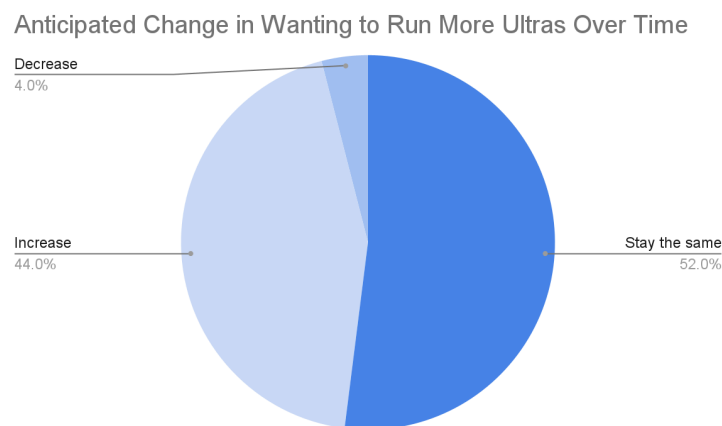


Figure 12. Anticipated Change in Wanting to Run More Ultras Over Time

## Discussion

After compiling and examining all of the data, an overarching conclusion was found along with smaller trends within the population.

The overarching theme shows that despite the varied paths that led the participants into ultra running, the results of having participated were very similar. It finds that no matter where one's starting point was or the process they took to completion, in the end, everyone has a profound love and respect for the sport. This conclusion was drawn from pre-race data and the positive responses related to the personal value and importance of the endeavor. The individuality of each runner causes them to choose a path best suited for them based on their background. That background is what shapes training plans, strategies, stressors, and motivations. While there were some common themes, how a runner approaches and reacts to situations while training and racing was varied. Successes across the field suggest there is no definitive right or wrong way to approach the sport. All runners valued how the sport of ultra running impacted their lives and strongly encouraged others to try it as well. This has led to an

ultra running community that welcomes newcomers to the sport and offers support and encouragement to those who want to challenge themselves and feel rewarded in the process.

### **Trends**

Other trends appeared as well. While more specific testing needs to be done, the information is still useful, worth noting, and interesting. The findings are as follows:

- Participants' outcomes were positively affected by their training.
- Older participants used less technology in developing their training plans.
- Community encouragement and support positively affect performance.
- Initial motivations and race-day motivations may differ.
- Motivation correlations to previous studies exist.
- The love of running may cause the race to meet expectations.
- Ultra runners often continue competing over time.

#### **Participants' outcomes were positively affected by their training**

Every racer stated that their training was worth the time and energy relative to their outcome. While there is a possibility everyone planned and trained exactly as needed, that is unlikely. Probably any training is simply better than no training at all. Regardless of a runner's uncertainty in developing a training plan or failure to adhere to the plan they selected, it's encouraging to know that even a little training helps.

#### **Older participants used less technology in developing their training plan**

No runner older than 46 years old used the internet as a source of race preparation or training. Though it is not directly tied to the study, it is an interesting observation that older generations are less likely to use online technology.

#### **Community encouragement and support positively affect performance**

Community encouragement and comradery played a big role in the runners' success, with 22% saying that it was "helpful" and 67% saying that it was "very helpful." The groups that runners say helped the most were "everyone in general" and more specifically, the personal support groups the runners brought with them. Each of these responses was selected by 31% of the participants. Spectators, through their presence, encouragement, and support directly contributed to more positive emotions and outcomes.

#### **Initial motivations and race-day motivations may differ**

The initial motivation for runners to begin the sport included wanting a challenge, striving for better health, or desiring social engagement. However, after those initial motivations wore off and the reality of the race set in, a new set of motivators was used. The change could stem from a need for a stronger motivator when one's body is pushed to extremes. More experienced runners said that they resorted to finding motivation in the pleasure of finishing the race while less experienced runners were more likely to be motivated by personal goals, social groups, or self-discipline. The responses suggest that not only do sources of motivation change before and during races but they also change over the lifetime of the runner.

### **Motivation correlations to previous studies exist**

The research done by Hanson et al in 2015 has similar results to those found above. Hanson found that ultra runners found motivation in life meaning while marathon runners found motivation in physical gains like weight loss or other health goals. This study affirmed Hanson et al's study in part by showing strong motives focused on the intangibles. Many participants mentioned that their motivation to be involved with the sport was challenge seeking or social interaction. However, what ultimately motivated many runners to finish the race was simply the feeling of accomplishment that they would receive for completing such a difficult task.

### **The love of running may cause the race to meet expectations**

Every single runner that responded that they loved the sport also responded that the race met their expectations. While the course is exceptionally beautiful and well-organized, there may be other reasons for this correlation. Perhaps one's love of the support and the positive emotions associated with competing in the events carries over to their belief that the event met their expectations.

### **Ultra runners often continue competing over time**

90% of the participants said that their desire to continue running ultras would increase or stay the same. This suggests that despite the hours of difficult planning, training, and racing, the post-race satisfaction is so meaningful that they continue racing.

### ***Importance of the Study***

This study is important because it increases the literature covering this sport which may promote more research and learning in this area. Everyone can learn from this research, experienced runners and newcomers alike. Also, this research has value to scientists because they can use it to advance medical research (Buman et al., 2008; Holt et al., 2014; Simpson et al., 2014; Watkins, 2017). Lastly, non-runners can read this to help understand the "why" in a fringe sport that puzzles so many.

### ***Possible Revisions***

There remains a lack of literature on ultra running. There are many ways this study could be expanded and improved. First, having a larger sample size would normalize outcomes and reduce the effect of outliers. It would be helpful to enforce full participation and completion by every participant. It would also be beneficial to gather data from different events, trail types, and weather conditions. One could gather more psychological data on the frequency and degree of mood changes before, during, and after the race. Studies could examine how one's physical condition affects their psychological condition. There is much more that can and should be done in studying ultra running.

### **Conclusion**

In conclusion, this study was completed to learn about the mind and body of an ultra marathoner and find the "why" that motivates these runners. It was found that there are multiple paths to the same destination. Each runner chose his or her way to train and prepare based on



what suited them and their situation. Ultimately, participants had very similar positive feelings about the experience and were drawn to future events to continue the experience. Hopefully, this research will not only encourage others to further research and study the sport of ultra running but also experience it for themselves.



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