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# What Should My Crew and Pacer Know for an Ultramarathon?

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Ultramarathons are often viewed as an individual sport. While every runner does not require or necessarily desire a crew or pacer, most runners would agree that such long races benefit from a team effort. It is important to understand that crewing and pacing for an ultramarathon varies with race rules and due to individualistic properties determined by each runner's race style and preference, including the amount and frequency of aid provided. However, there are some helpful principles and techniques applicable for those interested in being a more learned crew person or pacer. This article will outline a variety of anecdotal and evidence-based practices that may assist with crewing and pacing during an ultramarathon, including an introduction to basic principles, an analysis of mental obstacles, and an overview of race management solutions, all of which will be in the realm of crew and pacer responsibilities.

## Why Crew or Pace?

Crewing and pacing allows for a unique opportunity to experience the captivating sport of ultra-running on a personal and inclusive level beyond simply running these long races. Because of the distance and duration, ultramarathons are easily transitioned from individual to team events, with many endurance athletes attributing success in competition to their crew and pacers.

A runner supported by a crew evolves from fragmented individuals to one unit working towards a common goal. This investment often procures an exponential return of shared success and personal connection with the runner. His or her goal is easily integrated as your own. Runners often state crew contact is a primary means of motivation during low points in races; thus, serving an invaluable purpose. Additionally, aid stations, where runners receive aid from crews and volunteers, are in strategic locations along the course, providing set intervals where the different emotional and physical stages during an ultramarathon become evident. Crews experience both the highs and lows along the course which furnishes a greater appreciation for the entire journey. Finally, an overarching comradery develops for all people involved in the challenges encountered in an ultramarathon, between crews, pacers and runners. These relationships, like many formed during difficult moments, carry intrinsic meaning because of this unifying struggle.

While crews witness the race along set intervals, pacers experience the same rewards along a continuum. In addition to revealing the beauty and difficulty of the course, pacing gives testament to the participant's mental and emotional struggles occurring in parallel with the physical effort. This constant contact with a runner enables a deep human connection with its own challenges in problem solving, mental coaching, and physical damage control. Finally,

pacing offers firsthand experience for someone interested in participating in an ultramarathon in the future without the full physical burden. It is a great segue into the sport or a palpable reminder for the experienced runner.

The extremes of euphoria and despair during an ultramarathon cannot be adequately understood simply by watching. However, participating in a runner's journey by crewing and pacing are both positions of service offering a truly transformational experience along an otherwise unfathomable challenge.

**Preparation**

The basics of crewing involve course knowledge and race management. Races will usually specify which locations allow crew access and where runners can pick-up pacers. Additionally, pacers may be required to register, and there are varying rules on whether pacers can carry gear for their runner. Be sure to review these regulations before race day to avoid scenarios which may put your runner in jeopardy of penalty or disqualification.

It is advisable to have a hard copy of the race course and aid station locations when traveling through mountainous or remote areas. Obtain directions between each aid station the crew is planning to travel to, as terrain will often not allow for GPS/google map searches.

*Do you have a pace chart?* At a minimum, creation of a pace chart helps for familiarization with the course. Knowing which sections contain big elevation changes, water crossings, or long stretches without aid are important for both runner and crew. Additionally, this provides insight into how much time the crew has to prepare at an aid station. The waiting period before runner arrival can induce anxiety with unplanned delays, or panic with early appearances. Doing the preparatory work before race day will help mitigate these complications.

*How do you want to organize everything?* A well-oiled crew enables a runner to be at his or her best on race day, and will keep the runner's focus on his or her onus rather than giving directions or completing menial tasks. Realize that as the runner tires, so too does the crew, and it becomes easy to displace items and leave them behind. The foundation of crewing is logistics, and proper organization allows you to keep your head when your runner cannot. Test different methods but be disciplined in their use. There are many methods to stay organized. One example is separating items by aid station and making "mini-kits" that will be grab-and-go packages for specified mile-markers. This also requires the crew to take inventory, know where items are located, have extras for indispensable items like batteries and headlamps, and consider charging methods for technology. Label each of these kits, and estimate where to expect their use with a pace chart.

*Are we on the same page?* Set up a meeting with the runner, pacers, and entire crew in attendance before the race. Establishing a unified game-plan and identifying particularly difficult course sections can guide preparations for each crew location. Determine where pacers can be most effective, and make sure pacers all have their own gear. Runner supplies should never be

necessary to support anyone other than the runner. This also provides an opportunity for baseline crisis planning and designating a crew chief who should own race day logistics and make decisions when the runner cannot or the crew is divided.

Finally, crew and pacers must remember to plan for their own needs. You must be able to care for yourself with adequate hydration and caloric maintenance so the focus can remain on the runner. Seek shelter from the elements and sleep when possible to ensure you are fresh, both mentally and physically. A few crew supplies to consider include race day meals and snacks, hydrating liquids, shelter from sun/heat, sunscreen, bug repellant, sleeping supplies, warm clothing, extra batteries, GPS watches, headlamp(s), and charging cables.

**Race Day**

*What will you want the next time we see you?* Do not underestimate travel time to the start line, and make sure your runner takes in calories before the start of the race. Prepare a short summary of what to expect before first crew contact and verbally repeat this to the runner prior to start.

Upon arrival to each aid station, survey the area. Get an idea of the nutritional items offered by volunteers, especially those that are not in your crew kit. If there are "luxury services," be able to point/escort your runner to these, including sponge baths, ice coolers, heaters, porta-potties/toilet paper, medical aid, etc. Be noticeable - bring something easily spotted by your runner to identify where supplies are located. Be thorough by using a checklist at aid stations to prevent mistakes and forgotten tasks.

At every crew checkpoint, take inventory and make a travel bag to carry to the runner. You cannot expect to always have everything your runner is going to want. The key being, know where to get it, and get it quickly. Building a comprehensive list of supplies is an article in itself, and a very individualized process. However, the bulk of these items (night gear, rain gear, etc.) should only leave your vehicle during strategic stops, and the crew must think ahead for when they will be necessary.

Each contact with crew should begin with an assessment of the runner's needs with subsequent action. The following sections will discuss assessment tools and common strategies to help a crew and pacers manage race day.

**Mental Game**

*How are things going? Where is your head at?* The role of the crew and pacer often is that of the brain - think, anticipate, and motivate when the runner cannot. Evaluating your runner's cognitive and morale status is essential at every aid station or continuously as a pacer. Physical exhaustion can arise from mental fatigue. Stalled progress or underperformance without obvious physical manifestations likely can be attributed to mental duress or confusion. Do not underestimate your ability to impact your runner's mindset and keep the positivity coming.

Additionally, increased physical exhaustion causes impaired emotional control with more lability. Be forgiving and know that responses in harsh tone or out of frustration often arise from decreased functioning in either morale or cognition. Redirect your runner's focus in these instances with calm and kindness, reestablishing the goal at hand.
Know that as the miles accumulate, the crew or pacer may become the primary decision maker(s). Options and open-ended questions may be too strenuous for your runner to process, while yes/no questions require less brainpower. Adjust to your runner and be comfortable in this role which allows the runner's mind to focus on putting one foot in front of the other rather than dealing with forks in the road.

Motivational interviewing is one technique than can be used to refocus a morally dejected runner.[23] Motivational interviewing is based on five basic principles:[5]

1. Express empathy through active listening.
2. Develop discrepancy between goals or values and current behavior.
3. Avoid argument and confrontation.
4. Adjust to resistance rather than opposing it.
5. Support self-efficacy and optimism.

Often, the mental burden in an ultramarathon can be the most difficult obstacle to overcome. Additional strategies for crew targeting these impediments include motivational videos of friends and family, real-time video chats/messages, humorous signs and t-shirts. Music might be used strategically as an aid on isolated trails, particularly in middle miles if pacers are not allowed; however, some events do not permit earbuds or personal music devises. Additionally, caffeine is a helpful ergonomic aid that may be beneficial for a runner experiencing mental lows.[29,35]

As a pacer, maintaining your composure is a necessity. Realize while time is of the essence, minutes used to recalibrate and reset the mind may be time-saving by reinforcing goals and building mental fortitude. In addition to consistently using motivational interviewing during exchanges, other techniques may also be helpful. Verbally setting short term goals, such as distances with visual end points, can keep a runner moving while providing mental focus. Incorporating a reward system, such as timed rests, can also aid in maintaining overall forward progress. Diaphragmatic breathing exercises with timed inhale and exhale can help recalibrate attention, dispel negative affect and manage stress.[24] For a runner requiring repeated rests in a moral nadir, attempt a session of deep breathing, verbalizing counts for inhalation and exhalation that will bring total respiratory rate to approximately six breaths per minute.

Helping a runner overcome mental obstacles can be difficult and perhaps frustrating. Remain empathetic but firmly optimistic and keep your runner moving whenever possible.

**Big Systems**

*How much time do you want to spend here?* There are several systems that require constant maintenance throughout an ultramarathon, and often these are assessed by a crew or pacer in a

general fashion. However, being purposeful in an assessment can prevent major race blowups and allow for prevention instead of reactive solutions for these issues. A common saying in ultramarathoning is to "beware the chair," which follows Newton's third law as an object at rest stays at rest. Accordingly, crew and pacers should provide aid with their runner standing as often as possible, and it can be helpful to keep track of time in aid stations with predetermined goals for aid duration. However, the crew should practice rational decision-making and recognize when rest or even discontinuation of the race is the best solution. While the focus of a crew and pacer is to maintain forward progress, a priority of safety should always remain at the forefront of a support crew and pacing team.

*How much have you been drinking? Are you thirsty?* Runners, pacers and crew can be directed to an article by Hoffman[15] for an in-depth review of hydration strategies during prolonged exercise. Hydration status can be assessed in several ways with the intention to prevent dehydration and overhydration. If possible, pre-fill extra water bottles and know how to open hydration packs. Add ice to beverages in hot temperatures and confirm that a runner is drinking to thirst and not only using bottles for external cooling. Be aware that some sports beverages contain caffeine and communicate with your runner about when caffeine will be consumed. From a crew standpoint, logic can aid an assessment of hydration status. Check your runner's water bottles or hydration pack and note how much your runner has taken in since last contact. Major deviations in fluid consumption, more or less, should be a warning to pacer and crew. Hydration adjuncts such as oral rehydration salts (ORS) or Pedialyte, which balance the sodium-glucose ratio to maximize fluid uptake, may be beneficial at an aid station for a runner experiencing symptoms of dehydration.[33] Additionally, small volumes will allow you to observe changes and prevent overhydration. Viable techniques include sucking on ice chips and spoon-feeding fluids at a maximum rate of 5 mL every 1-2 minutes to prevent gastric distension and reflex vomiting. Overhydration is a more concerning issue, frequently seen in endurance activities[17] and seen with weight gain or inadequate weight loss.[25,18] Runners can excel with weight losses of 2-7% of their body weight over the course of an ultramarathon[16] but a hyponatremic athlete can suffer long term consequences. The crew should not aim to maintain body weight in its entirety, but should note vast changes in fluid intake in conjunction with the onset of physical signs and symptoms. Finally, have a low threshold to contact race medical aid should runners continue to decline with an inability to continue exercise.

*How does the temperature feel?* Thermoregulation is another basic function requiring attention by a crew and pacer. Be cognizant of ambient temperatures throughout a race and know the forecast with humidity and wind-chill temperatures along the course. Additionally, temperatures decrease approximately 4.3-5.0 °C (7.7-9 °F) per 1000 m increase in altitude, and the opposite effect occurs with rising temperatures at lower altitudes.[30] While your runner can adapt with exercise intensity, crew and pacers can prepare effective methods to help manage this variable.

*Do you want ice or other cooling?* For extremes of heat, cooling techniques can be beneficial at each contact. The most effective method of core body cooling was determined to be full-body immersion in ice water; however, more accessible techniques might employ ice slurry ingestion,

full ice vest, facial water spray, neck cooling packs and menthol cooling.[2,4,27] Many races include natural water sources that may provide cooling relief along the course. Rises in core body temperature can make continuation of exercise more difficult, and dehydration may occur, but is not always present. Rest in a shaded location, positioning with feet elevated above the head, cooling via available methods and if possible, oral rehydration are all helpful ways to mitigate the effects of heat. Of note, exposing the skin to temperatures below 30°C (86°F) can cause onset of peripheral vasoconstriction and the onset of shivering.[3] If this phenomenon can be overcome with peripheral massage, continue cooling while core body temperatures remain elevated.[34] Finally, while the human body has many innate methods of moderating heat, pace regulation is a necessary adjustment of which runners should be cognizant. Runners who do not properly control pace in ultramarathons occurring in hot weather are usually those who suffer because of it. A good crew, in cooperation with their runner, will recognize the need to alter a race plan due such uncontrolled variables as extreme heat.

*Are you staying warm? Is anything wet?* The body better adapts to heat than it does to cold. For extremes of cold, manage clothing at each contact and apply a warm, insulated layer when your runner is stagnant. Anticipate decreasing temperatures when races take place overnight and/or at high altitudes and use a layered approach to clothing.[13] Realize the sun may set between aid stations and dress your runner appropriately. A base layer with moisture wicking away from the skin is important, and packing an outer lightweight rain jacket with a hood can be a race-saving precaution at high altitudes for unexpected temperature declines. Precipitation of rain or snow in conjunction with declining temperatures after prolonged exercise can risk excessive core body cooling. A crew should always remove and replace wet items with warm, dry clothing for a runner suffering from cold. If the runner will be sedentary for any period of time while at an aid station, immediately apply a warm, insulated layer (ex. large blanket or coat) to be removed once activity resumes. Duration at aid stations can become very lengthy in cold weather, especially when there are heaters and fires. Crew and pacers should attempt to minimize stasis for runners adequately hydrated and maintaining body temperature with activity and/or shivering. However, active external warming may be necessary prior to a runner continuing a race, in which case, re-warming of the trunk should always be undertaken prior to the extremities.[10,20] After removing damp clothing, cover the trunk with blankets or other types of insulation, and promote oral intake of warm fluids and glucose-containing foods as permitted or suggested above with re-hydration techniques. The hope is that these measures are not necessary, as an attentive crew and pacer can prevent effects from less than desirable weather with adequate preparation and attention to clothing.

*What did you eat since I last saw you? What do you feel like eating?* Develop a nutrition plan with your runner and have an idea how many calories he or she usually takes in per hour. Utilize mini-kits and approximate which calorie sources will need to be restocked at each aid station. Performing basic calorie counting during the race can make crew aware when intake starts to decline with time to brainstorm ways to encourage eating. Energy unavailability, in the forms of carbohydrate and fat, is a major contributor to the decline in athletic productivity and

performance.[9,11,19] Decreased intake often causes a runner to transition from running to walking in order to reduce caloric expenditure.

A simple equation can be used to estimate the total caloric expenditure of either running or walking[14]:

Running: 0.75 x weight (lbs) = Caloric utilization/mile
Walking: 0.53 x weight (lbs) = Caloric utilization /mile

Caloric expenditure of running and walking has been shown to be affected by running surface, and mountain terrain has been shown to be significantly higher than the above approximation.[12,22] The overall energy expenditure during an ultramarathon will exceed caloric intake, and during longer races all runners operate at a caloric deficit, but the goal is to reduce this overall discrepancy. In addition to calorie counting, the crew and pacer should consider other effective nutrition management strategies including timed eating intervals and portion control. While the most commonly cited reason for decreased caloric intake is gastrointestinal (GI) distress, this process is multifactorial with causation rooted in both hydration and thermoregulation, among other variables.[8] For more information on GI distress, refer to an article by Costa.[7] An accessible solution can be to offer a variety of nutrition options to a runner in caloric decline. Often prolonged ingestion of high carbohydrate sources becomes unpalatable with onset of taste fatigue. However, decreased caloric intake can be a symptom of a deviation from more basic homeostasis. Correction of either thermoregulation or hydration status are excellent starting points to help a runner who has stopped consuming calories.

**Smaller Nuisances**

While the above systems require constant management throughout an ultramarathon, small nuisances can become progressively worse and tremendously exacerbate an already difficult endeavor. These areas can become incorporated into a checklist at each runner contact that can be a great adjunct to address problems before they arise or early after onset.

*Have you applied sunscreen in the last 2 hours?* Sunburn is uncomfortable and has long term effects with repeated sun-related skin damage. The acute effect on exercise has been shown to be limited to discomfort;[26] however, this should not be dismissed. UVA and UVB rays continue to penetrate to the earth's surface even on cloudy days, and UV radiation exposure increases at higher altitudes. Make sure the sunscreen is broad spectrum, water resistant and at least SPF 30 which will protect against 97% of harmful UVA and UVB rays.[28] Crew and pacers should apply sunscreen approximately every 2 hours when possible to all sun-exposed skin surfaces. Additionally, remember to apply lip balm with sun protection to prevent chapped lips and sun damage.

*Is anything rubbing?* Chafing occurs with repetitive friction causing skin inflammation, and occurs regularly in ultramarathons. Gear testing prior to race day should be the primary prevention for chafing; however, quick fixes of clothing or gear rubbing should be addressed as soon as possible. Skin-on-skin chafing can occur with shearing forces increased by moist skin and should be prevented with taping or regular lubrication application. Nipple chafing can be caused by clothing friction and is easily prevented or abated with taping and use of moisture wicking materials.[1]

*Do you feel any hot spots or blisters?* Blisters occur with shearing forces that damage superficial skin layers that then fill with fluid. Most commonly these occur on the toes, balls of the feet and posterior heel.[21] Whenever your runner removes socks and shoes, do a quick foot assessment and look for blisters or reddened skin from rubbing. Prevent blisters by drying your runner's feet, regularly applying targeted lubrication and taping, and dressing with dry socks and shoes. Ask your runner if they feel any "hot spots" which can evolve into blisters. For blisters that have already developed, the best-case scenario is to lance the blister with anterior and posterior holes to allow drainage while keeping the overlying skin layer intact. The hole should be large enough to prevent resealing and on the inferior aspect to allow gravity to assist with drainage. A small amount of gauze or lubricant can be applied over only the blistered skin followed by a compression dressing such as tape and/or mole skin to reduce further sheering.[6] An open blister without overlying skin may benefit from a hydrocolloid patch.

*Is anything wet and uncomfortable?* Skin maceration is the breakdown of the barrier skin layers due to prolonged exposure to warmth and moisture, with significant skin breakdown and disruption after approximately 4-6 hours.[31,32] Particularly the feet will appear pale, blanching with wrinkling of the skin. This process is different from blistering and chaffing, and is easily prevented with good crew management. Prevention begins with identifying articles of clothing that will not have an opportunity to dry due to rain, water crossings or sweating. Check your runner's shoes to make sure they drain following water submersion. Remove wet clothing, most notably socks, at regular intervals if such clothing is not drying throughout the race. Routine application of talcum powder after drying can be helpful to stop progression of maceration, but can form a paste and be abrasive if soaking occurs.

*Do you want your glasses? Don't forget your headlamp!* Know if your runner has vision problems or wears corrective lenses. Contact lens wearers may experience dry eyes, and application of natural tears can be beneficial. Wearing protective, tinted glasses during the day will help prevent eye fatigue and night-blindness during later periods of low light or overnight. Also, anticipate when your runner will experience darkness and make sure he or she will have a working headlamp. Always equip your runner with extra batteries whenever a headlamp will be necessary.

## Conclusions

*What else can we do?* While this introduction provides a starting point for crewing and pacing during an ultramarathon, perhaps the most intoxicating and attractive aspect to these experiences is the inability to fully prevent or even prior plan for every scenario. Undoubtedly, your runner will find creative ways to keep you searching for solutions. When these moments arise, approach them with energy and compassion, and know that struggle is an inherent and treasured facet to racing these long distances. Finally, to further your knowledge of ultra-endurance sports and better prepare yourself and your runner, utilize the resources available at http://ultrasportsscience.us/athlete-education/. Happy running.

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