Emotions and trait emotional intelligence among ultra-endurance runners

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Abstract

Objectives The aim of this study was to investigate relationships between trait emotional intelligence and emotional state changes over the course of an ultra-endurance foot race covering a route of approximately 175 miles (282 km) and held in set stages over six days. Design A repeated measures field design that sought to maintain ecological validity was used. Trait emotional intelligence was defined as a relatively stable concept that should predict adaptive emotional states experienced over the duration of the race and therefore associate with pleasant emotions during a 6-stage endurance event. Method Thirty-four runners completed a self-report measure of trait emotional intelligence before the event started. Participants reported emotional states before and after each of the six races. Results Repeated measures ANOVA results showed significant variations in emotions over time and a main effect for trait emotional intelligence. Runners high in self-report trait emotional intelligence also reported higher pleasant and lower unpleasant emotions than runners low in trait emotional intelligence. Conclusions Findings lend support to the notion that trait emotional intelligence associates with adaptive psychological states, suggesting that it may be a key individual difference that explains why some athletes respond to repeated bouts of hard exercise better than others. Future research should test the effectiveness of interventions designed to enhance trait emotional intelligence and examine the attendant impact on emotional responses to intense exercise during multi-stage events.

Keywords: Mood; Self-regulation; Psychological skills; Affect; Endurance

1. Introduction

Research has shown that athletes experience intense emotions before, during and following competition in ultra-endurance events. Completion of an endurance event such as a marathon is associated with overcoming emotional barriers to performance such as intense fatigue coupled with unpleasant emotions. Consequently, examination of factors that might aid the development of strategies aimed to manage such emotions could not only aid conceptual clarity, but also help to develop strategies intended to assist the performance and/or well-being of the athlete.

There is evidence to suggest that ultra-endurance athletes competing in events lasting several days encounter a number of acute psychological and physiological challenges. These include insufficient energy intake, sleep deprivation, and the accompanying alterations in emotional states. However, it should be noted that few studies have investigated changes in emotions during multiple-day endurance performance. The present study addresses this gap in the literature by investigating changes in emotions among runners participating in a multiple day running race.

Studies examining emotional responses to the completion of repeated bouts of intense exercise tend to report a significant emotional disturbance. The oncoming of an emotional disturbance can be found by examining the response to a single session with findings showing that most athletes report an increase in fatigue and reduction in vigor scores. Additionally, evidence shows that athletes report experiencing increases in anger, confusion, depression, and

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tension concurrently.\textsuperscript{4,6,11} This emotional profile has been described as an ‘‘inverse iceberg profile’’ and is associated with poor performance.\textsuperscript{11}

Recent research proposes that meta-beliefs on emotional states play an important role in the impact of such emotions on performance.\textsuperscript{13} This could be influential when applied to long duration and intense exercise such as marathon running. The nature of the task means that all athletes will experience the sensations of physiological fatigue. However, some athletes will interpret these physiological sensations as an indication of effort made towards attaining personal goals. Among athletes likely to attain performance goals, sensations of fatigue should associate with experiencing pleasant emotions.\textsuperscript{14} In such instances, athletes would seek to maintain physiological sensations of fatigue within tolerable levels. It is possible that endurance athletes accept feelings of fatigue as a necessary part of pursuing challenging goals.\textsuperscript{13} However, if an athlete interprets fatigue as being indicative of their inability to cope, and feels that slowing down or stopping is the only strategy available, then slowing down is likely to lead to increased frustration and anger due to a failure to attain performance goals.\textsuperscript{14} This process could be exacerbated if the same individual requires the attainment of a certain finish position or time in order to experience a sense of satisfaction.

Recent research shows that athletes who develop realistic expectations of how they are likely to feel, report pleasant emotions during repeated bouts of intense exercise.\textsuperscript{4} Further, in a study that tracked emotional changes of an arctic explorer on a 44-day South Pole expedition, researchers found that fatigue increased and vigor reduced over time, with no discernible patterning for unpleasant mood states.\textsuperscript{15} Follow-up interview data indicated that she used an array of coping skills to manage these emotions.\textsuperscript{16} For example, she would suppress unpleasant emotions such as feeling depressed until a point later in time when she could deal with them. Further, she held a belief that if she attended to its affective content and associated motivational implications of such emotions, then this would be detrimental to the success of the expedition and her wellbeing.

Recently researchers have proposed that individual differences in how people regulate their emotions might explain emotional responses to different situations.\textsuperscript{17,18} However, beliefs in the ability to manage emotions have been studied under different frameworks.\textsuperscript{17} One framework that is growing in popularity is trait emotional intelligence.\textsuperscript{18} Trait emotional intelligence is concerned with beliefs in one’s capability to be aware of emotions, the effects of emotions on thoughts and behavior, and strategies used to regulate emotions. Two meta-analyses provide empirical support for the positive influence of trait emotional intelligence on health.\textsuperscript{19,20} Findings in sport psychology lend some support to the utility of assessing trait emotional intelligence for use with athletes. Trait emotional intelligence has been found to: (a) be related to pre-competitive mood associated with optimal performance,\textsuperscript{21} (b) correlate with frequent use of psychological skills and strategies used in competition and training settings,\textsuperscript{22} and (c) predict objective performance outcomes.\textsuperscript{23} Trait emotional intelligence should relate to both emotional states before competition and to how emotions unfold during exercise. It is proposed that individuals reporting high scores of trait emotional intelligence should report higher scores of pleasant emotions and lower unpleasant emotion scores than individuals reporting lower trait emotional intelligence.\textsuperscript{18}

The aim of this study was to investigate relationships between trait emotional intelligence and changes in emotional states over the course of a six-day endurance event. In accord with previous findings, we hypothesized that there would be significant changes in emotions; vigor would decrease and fatigue increase after each race, and there would be a gradual increase in this trend over the course of the 6-day event. In terms of other emotions, we hypothesized that as trait emotional intelligence is proposed to associate with the ability to control emotions, high trait emotional intelligence should associate with pleasant emotions and this effect would be sustained throughout the duration of the event.

2. Methods

Participants were 34 runners ranging in age from 23 to 59 years; 24 were males and 8 females. Participants varied in the number of years they had been running with 10 runners having fewer than 5 years experience whilst other runners had over 20 years experience. They trained for an average of 13 h per week. Participants were competing in the Marathon of Britain race which is a 175 mile (282 km) ultra-endurance foot race divided into stages: Stage 1 is 17 miles (28 km); Stage 2 is 29 miles (47 km); Stage 3 is 32 miles (51 km); Stage 4 is 33 miles (53 km); Stage 5 is 54 miles (87 km) and Stage 6 is 10 miles (16 km).

Emotional states were monitored daily using the Brunel Mood Scale (BRUMS).\textsuperscript{24} The BRUMS is a shortened version of the Profile of Mood States \textsuperscript{25} and assesses anger, confusion, depression, fatigue, tension and vigor. In order to assess a range of pleasant emotions, we assessed happiness and calmness using items from the UWIST.\textsuperscript{26} Using the present sample, internal consistency coefficients for each subscale were: anger = 0.72; calmness = 0.74; confusion = 0.72; depression = 0.72; fatigue = 0.75; happiness = 0.81; tension = 0.72; and vigor = 0.75.

A 33-item self-report measure of trait emotional intelligence (EIS) was used.\textsuperscript{27} The EIS has demonstrated factorial validity\textsuperscript{28} and predictive validity\textsuperscript{22,23} among athletic samples. It should be noted that the choice of which measure of trait emotional intelligence to use has been the subject of extensive debate.\textsuperscript{18,29} Although recent research indicates that the Trait Emotional Intelligence Questionnaire is a superior measure,\textsuperscript{29} a limitation of this scale is that it has not been used in the sport setting. Items for the EIS are rated on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly

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Examples of items include 'I easily recognize my emotions as I experience them' and 'I know what other people are feeling just by looking at them'. The alpha coefficient was 0.78 in the present study.

Volunteer participants completed the EIS and BRUMS at registration. They completed the BRUMS twice daily; at breakfast and then immediately after completing each stage. Trait emotional intelligence data were analyzed by dividing them into either a high or low group based on the median value. Differences in emotions by trait emotional group over the duration of the event were analyzed using a mixed-model ANOVA (within and between subjects). A second mixed-model ANOVA was used to analyze differences in emotions before and after each race by trait emotional group.

3. Results

The results are visualized in Fig. 1 and the ANOVA results are presented in Table 1. As Fig. 1 illustrates, fatigue increases and vigor reduces during each run, with the reverse occurring overnight as runners recovered. This effect appears to occur after each run other than for stage 6 when fatigue scores reduce and vigor scores increase on completion of the race. A visual inspection of the data illustrates a progressive increase in fatigue and reduction in vigor over the course of the 6-stage event. ANOVA results indicate significant differences in anger, calmness, confusion, fatigue, happiness and vigor (see Table 1). Follow-up Scheffé tests revealed that calmness reduced significantly before the fourth race but increased significantly after the final race. Happiness followed a similar pattern, increasing significantly after participants completed the final race. Results for vigor indicate that it reduced significantly following the fifth race, and increased significantly overnight before the start of the sixth race. Post-race fatigue was significantly higher than pre-race fatigue, with post-race levels reducing overnight before participants started the next race. This trend occurred for each day of the event other than after the fifth race, wherein fatigue scores remained high. Fatigue increased significantly after the final race. Confusion increased before the fifth race, although the interaction effects for differences in confusion by trait emotional intelligence can explain this result over time.

Results show significant interaction effects for changes in the anger and confusion over time by trait emotional intelligence. Follow-up Scheffé tests indicate that athletes low in trait emotional intelligence showed a significant ($p < 0.05$) increase in anger and confusion before the fifth race, whereas athletes high in trait emotional intelligence, who reported low anger scores before and after the race, showed no differences. As evident in Table 1, ANOVA results for the main effect for trait emotional intelligence on emotions indicated that high trait emotional intelligence was associated with higher calmness and happiness, coupled with lower anger, confusion, depression, fatigue and tension.

4. Discussion

The aim of the present study was to investigate relationships between trait emotional intelligence and changes in emotional states before and after each stage of an ultra-endurance race. Results demonstrate that participants report significant fluctuations in emotions during the six-stage race. As Fig. 1 illustrates, reductions in vigor and increases in fatigue are consistent with findings from previous research. Significant differences in anger, calmness, confusion, fatigue, happiness and vigor lend support to the notion that competing in repeated bouts of intense exercise is associated with emotional disturbance. However, it should be noted that despite the severity of the distance covered, runners did not report experiencing an inverse iceberg associated with engaging in repeated bouts of intense exercise without sufficient recovery. Unlike some experimental studies wherein the volume and intensity of training are specified by the researcher, participants in the present study could adjust the speed at which they completed each race. The correlational design employed in the present study precludes an examination of the causal links between exercise intensity/volume and emotional disturbance.

We hypothesized that trait emotional intelligence would be associated with pleasant emotions throughout the duration of the event. In support of this hypothesis, results demonstrate trait emotional intelligence was associated with pleasant emotions including higher calmness and happiness, coupled with lower anger, confusion, depression, fatigue and tension. Previous researchers have argued that trait emotional intelligence is a crucial variable in the regulation of emotions. Emotional intelligence should inform the process of monitoring on-going emotions and their relationship with appraised situational demands, a proposal consistent with the present findings although the correlational nature of the design used in the present study is acknowledged as a limitation.

Results show an interaction effect for relationships between trait emotional intelligence and changes in emotions. Further, that low scores on trait emotional intelligence associated with a significant increase in anger and confusion before the fifth race. Runners would be aware that after completing the longest stage (day 5, race 5) they would still have a further stage to complete the next day. We suggest that stage 5 represented a significantly greater challenge than other stages and this is reflected in alterations in emotions. Elevated anger and confusion could stem from a perceived sense of frustration that can be ascribed to uncertainty in having sufficient personal resources to cope with this stage.

An acknowledged limitation of the present study is that we did not assess strategies used to regulate emotions. Although previous research shows that trait emotional intelligence correlates with frequent use of psychological skills both in training and in competition and the use of psychological skills is associated with enhanced endurance performance, we can only speculate that emotionally intelligent athletes used psychological skills. We suggest future research should
Table 1
ANOVA results for mood state changes before and after each race by emotional intelligence.

<table>
<thead>
<tr>
<th></th>
<th>Pre and post mood</th>
<th>Emotional intelligence</th>
<th>Time × emotional intelligence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$F_{1,21}$  $p$</td>
<td>Partial $\eta^2$</td>
<td>$F_{1,21}$  $p$</td>
</tr>
<tr>
<td>Anger</td>
<td>6.06  0.00</td>
<td>0.76</td>
<td>7.22  0.001</td>
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<tr>
<td>Calmness</td>
<td>11.62  0.00</td>
<td>0.27</td>
<td>6.05  0.02</td>
</tr>
<tr>
<td>Confusion</td>
<td>3.40  0.00</td>
<td>0.10</td>
<td>8.86  0.01</td>
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<tr>
<td>Depression</td>
<td>1.22  0.27</td>
<td>0.04</td>
<td>7.94  0.01</td>
</tr>
<tr>
<td>Fatigue</td>
<td>25.30  0.00</td>
<td>0.45</td>
<td>11.26  0.00</td>
</tr>
<tr>
<td>Happiness</td>
<td>10.84  0.00</td>
<td>0.26</td>
<td>14.22  0.00</td>
</tr>
<tr>
<td>Tension</td>
<td>14.22  0.00</td>
<td>0.31</td>
<td>6.11  0.02</td>
</tr>
<tr>
<td>Vigor</td>
<td>13.20  0.00</td>
<td>0.30</td>
<td>3.10  0.09</td>
</tr>
</tbody>
</table>

examine relationships between trait emotional intelligence, strategies to regulate emotions and changes in emotions. An extension of this line of research would be to examine relationships between subcomponents of trait emotional intelligence rather than assessing it as a global construct.

5. Conclusion

Findings of the present study demonstrate that runners experience significant changes in emotions during repeated bouts of long-distance running. The findings also showed that trait emotional intelligence correlated with pleasant emotions over the course of six-stage multi-day event.

6. Practical implications

- It is suggested that intervention work should focus on teaching athletes to become aware of the emotions they experience before, during and after running.
- Intervention work should encourage athletes to reflect on the informational value that each emotion brings, for instance, if a runner felt anxious, then he or she should examine the thoughts that accompanied this feeling and whether these thoughts were motivating or de-motivating. Athletes might chose to increase, decrease or maintain emotions based on beliefs on whether they are functional for running performance.
- Athletes should be taught strategies to control and use emotions to aid performance towards achieving performance goals.
- Consistent with recent theoretical proposals,13 we suggest that runners develop "if then" plans to manage sensations of fatigue. For example, if I feel fatigued during running, and there are still 5 miles to go, then I will focus on relaxing my arms concentrating on the smoothness of my technique.

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References