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How should I regulate my emotions if I want to run faster?

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Abstract

The present study investigated the effects of emotion regulation strategies on emotions and 1600m running performance. In a three-stage study, participants (N = 15) reported emotional states associated with best, worst and ideal performance. Results indicated that a best and ideal emotional state for performance comprised of feeling happy, calm, energetic, and moderately anxious whereas worst performance comprised feeling downhearted, sluggish, and highly anxious. In stage 2, emotion regulation interventions were developed using online material and supported by electronic feedback. One intervention motivated participants to increase the intensity of unpleasant emotions (e.g., feel more angry and anxious). A second intervention motivated participants to reduce the intensity of unpleasant emotions (e.g., feel less angry and anxious). In stage 3, using a repeated measures design, participants used each intervention before running a 1600m time-trial. Data were compared with a no treatment control. Results indicated that an intervention motivated to increase the intensity of unpleasant emotions associated with higher anxiety and lower calmness scores, but no significant effects on 1600m running time. Significant differences were found in the pacing strategy followed. Following the intervention to reduce the intensity of unpleasant emotions participants ran a significantly slower time compared to the control condition for the 1st 400m and faster time for the final 400m. Findings suggest emotions influence the choice of pacing strategy followed, and we suggest athletes should consider using an emotion regulation strategy that supports their preferred pacing strategy.

Keywords: Emotion regulation, emotion, meta-emotional beliefs, psychological skills, endurance performance.

How should I regulate my emotions if I want to run faster?

Evidence indicates emotions are predictive of performance (Beedie, Terry, & Lane, 2000; Hanin, 2003, 2010; Lazarus, 2000) and that athletes engage in strategies to regulate their emotions to perform better (Lane, Beedie, Jones, Uphill, & Devonport, 2012; Wagstaff, 2014). Although emotion regulation is relevant to all sports, in endurance performance, emotion regulation and fatigue management are likely intertwined. In fact Noakes (2012) argued that "fatigue is principally an emotion, part of a complex regulation, the goal of which is to protect the body from harm" (p. 2). Evidence demonstrates that runners use emotion regulation strategies without formal training, many of which resemble psychological skills such as imagery, self-talk and goal setting (Stanley, Lane, Beedie, & Devonport, 2012).

Lane et al. (2012) argued there are at least two distinct motivations to regulate emotion – hedonic and instrumental. Hedonic emotion regulation is characterised by trying to increase the intensity of pleasant emotions and reduce the intensity of unpleasant emotions. A great deal of research suggests that this approach to emotion regulation could yield positive performance (Beedie et al., 2000; Hanin, 2010; Morgan, 1980; Raglin, 2001). An instrumental approach to emotion regulation is one in which an athlete seeks to feel emotions that will help performance. For example, many athletes like to feel anxious before an event and will up-regulate that emotion accordingly (Hanin, 2010; Lane, Beedie, Devonport, & Stanley, 2011; Stanley, Lane, Beedie, & Devonport, 2012; Stanley, Beedie, Lane, Friesen, & Devonport, 2012).

Emotion regulation during endurance sport is proposed to be influenced by progress toward goal achievement (Baron, Moullan, Deruelle, & Noakes, 2011; Beedie, Lane, & Wilson, 2012; Noakes, 2012; Lane, 2001; Wilson, Lane, Beedie, & Farooq, 2012). Lane (2001) reported that an emotional state comprising anger, tension and vigor associated with high goal-confidence, with depressed mood and very high tension associated with low goal-

confidence. Lane and Wilson (2011) reported that runners high in emotional intelligence experienced pleasant emotions in a repeat stage marathon event. Wilson et al. (2012) conducted an experimental study where participants were provided false feedback by informing riders they were 5% behind (negative) or ahead (positive) of their self-set goal. Compared to false positive feedback conditions, false negative feedback associated with higher anxiety, anger, and sadness, as well as higher lactate and oxygen usage. False negative feedback also produced an erratic pacing strategy compared to false positive feedback. In negative feedback conditions participants attempted to ride faster, producing spikes showing high power output, followed by periods of low power output. However, despite different pacing strategies between conditions, no significant difference in completion time between false negative and false positive conditions was observed.

An optimal pacing strategy is one that ensures energy expenditure is appropriately regulated. Such regulation is determined by an athlete's perceptions of the intensity required to complete a defined distance as fast as possible, a process that is influenced by emotions (de Koning et al., 2011; Tucker & Noakes, 2009). A pacing strategy favored in cycle racing is to follow an even power output distribution (Atkinson, Peacock, St Clair Gibson, & Tucker, 2007). However, analysis of the pacing strategies adopted in 32 World 1-mile running records suggest athletes favor a fast first and last lap as opposed to four even-paced laps (Noakes, Lambert, & Hauman, 2009). With regard to the latter strategy, if negative feedback leads to increased anger and anxiety, which in turn associates with bursts of effort, then unpleasant emotions could be helpful. Extending this logic to methods an athlete might use to develop her/his own emotion regulation strategies, if they believe anxiety helps performance (Hanin, 2010; Lane et al., 2011), then arguably, negative self-talk might help her/him perform better via repeat bouts of intense effort.

The aim of the present study was to extend examination of emotion regulation and pacing in cycling (Beedie et al., 2012; Wilson et al., 2012) to running performance. In contrast to the deceptive methods used by Beedie et al. (2012), the present study used guided self-regulatory methods to alter emotion. The approach seems a logical extension of previous research as evidence shows runners use self-regulation strategies as part of preparation for competition (Stanley, Beedie et al., 2012; Stanley, Lane et al., 2012). We investigated the effects of strategies designed to increase or decrease the intensity of unpleasant emotions, on emotion, pacing strategy and overall 1600m performance. Hypothetically high anxiety or anger would lead to a fast first 400m. However, in terms of overall 1600m performance, we hypothesized that overall finish times would not be significantly different between conditions.

Method

Participants

Fifteen runners (Male: *n* = 8, Female: *n* = 7; age 27.41 years, SD = 8.44 years) participated in the present study. They reported running an average of 20.55 miles (SD = 19.75 miles) per week. None of the participants had previously worked with a sport psychologist. Participants competed in events ranging from 5km to marathon distances.

Measures

Emotions

Emotions measured were: “Calm,” “Happy,” “Energetic,” “Sluggish,” “Downhearted,” “Angry” and “Anxious” taken from a previously validated scale (Terry, Lane, & Fogarty, 2003). The scale was purposefully short as participants completed this measure 6 times over the duration of the study. The scale was used to assess emotion associated with best and worst performance and was also completed prior to each of three 1600m time trials.

Performance

Performance was a 1600m maximal time trial on a standard 400m running track. Time was recorded for each 400m to facilitate examination of pacing strategy We compared actual lap time with the average lap time (run time/4) calculated from total 1600m completion time.

Procedure

Following institutional ethical approval, participants were recruited into the present study via a link hosted on the Runners World website and the website of the researcher team. The study was then conducted in three distinct stages.

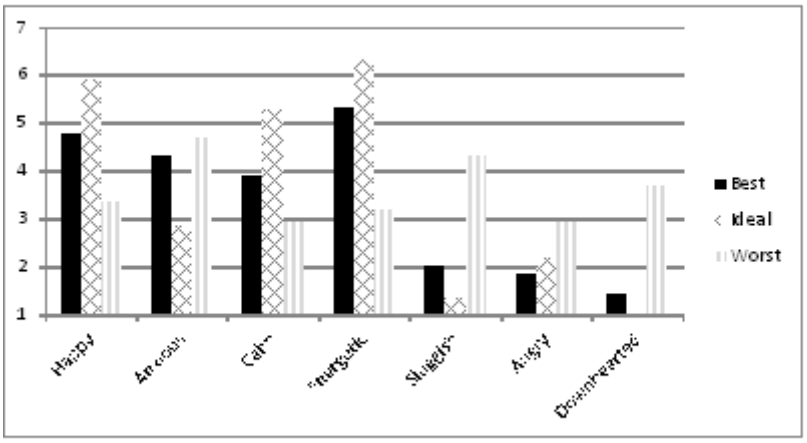
The purpose of stage 1 was to establish any differences in emotions associated with best and worst performance for each participant. The rationale for this process was to facilitate the development of an individualized emotion regulation intervention for each participant. Participants completed an informed consent form and provided demographic information including previous running experience. They then recalled emotions associated with best and worst running performance. They also estimated an emotional state that they believed represented an ideal, one in which they would produce a peak performance. Participants were provided with personal feedback via email describing the emotional state associated with best, worst and ideal performance.

When seen collectively, there were large differences in emotions (Wilks' Lambda = .66, p = .001, Partial Eta^2 = .34), with a significant difference between each condition (Best vs ideal: Wilks' Lambda = .30, Partial Eta_2 = .70; Best vs worst: Wilks' lambda = .28, Partial Eta^2 = .71; Worst vs ideal: Wilks' lambda = 19, Partial Eta^2 = .81, see Figure 1). The emotional state associated with ideal performance was characterised by feeling happier, calmer, and more energetic, less anxious, sluggish, and downhearted than emotions associated with best and worst performance (Figure 1). This suggested that regulation efforts should be motivated hedonically. However, the notion that unpleasant emotion might help

performance was evident in the anxiety data which suggested that moderately intense anxiety associated with best performance (see Figure 1).

The aim of stage 2 was to develop personal emotion regulation interventions. Participants were asked to reflect on their emotional profiles and consider what strategies they use to regulate emotions in training and competition (see Stanley, Beedie et al., 2012). Material to support these reflections was made available via a video hosted on the project website and YouTube (websites to be inserted later). Feedback was provided electronically via email. As expected, and consistent with findings reported by Stanley, Beedie et al. (2012), participants reported strategies that they used to modify emotions. For example, in order to decrease the intensity of unpleasant emotions, participants reported changing perspective and modifying physiological manifestations of emotions via, for example, deep breathing. To increase the intensity of unpleasant emotions, participants reported reappraisal of the situation by raising its importance. They indicated that the challenge was not to raise anxiety, but to regulate it to an optimum. Participants reported meta-emotional beliefs that anxiety can help energize them for a good performance. However, participants also noted that getting the balance just right between optimal levels of anxiety and excessive anxiety was difficult to attain.

Figure 1: Emotional responses with reference to best, ideal and worst performance



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148 The aim of stage 3 was to use quasi-experimental methods to test the effectiveness of
149 emotion regulation interventions developed in stage 2. A no-treatment condition was used as
150 a control. Participants completed three 1600m time trials. They received no verbal feedback
151 relating to their performance and no time data. All trials were undertaken individually so as
152 not to introduce interpersonal competition. The order in which the interventions were
153 presented was randomized. After using an emotion regulation strategy (where applicable)
154 participants rated their emotional state.

155 **Results**

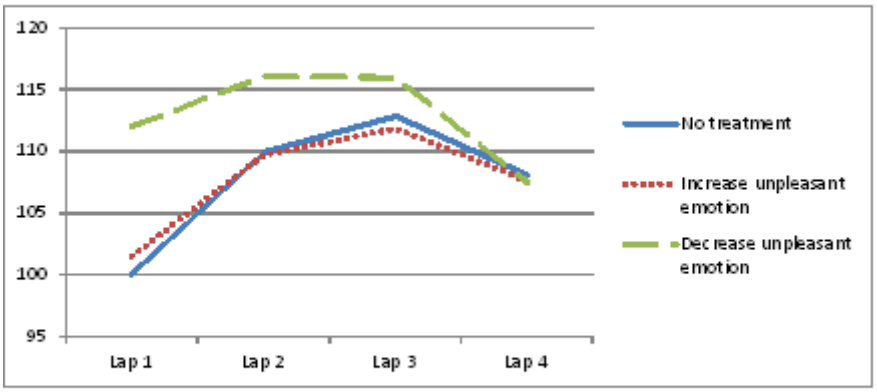
156 **Effects of interventions on self reported emotions**

157 Repeated measures MANOVA indicated a significant intervention effect (Wilks
158 Lambda $_{14,66}$ = .38, p = .002, Partial Eta^2 = .38) for differences in emotion between
159 intervention/control conditions. Follow up analysis indicated higher anxiety and lower
160 calmness following an intervention designed to increase the intensity of unpleasant emotion.
161 However, there were no significant differences in emotions between no-treatment and anxiety
162 reduction conditions.

163 **Effects of interventions on 1600m running performance**

Repeated measure ANOVA indicated no significant intervention effect Therefore compared to no-treatment, interventions did not significantly improve or worsen 1600m running time ($F_{2,41} = .26$, $p = .78$). However, results indicated significant interaction effects ($F_{3,37} = 5.75$, $p < .001$, Partial $Eta^2 = .29$). As Figure 2 indicates, interventions designed to reduce the intensity of unpleasant emotion were associated with significantly slower running times for the first lap and significantly faster times for the final lap compared to the interventions designed to increase the intensity of unpleasant emotion and controls. It should be noted that there was a main effect for pacing with participants recording fast times for the 1st 400m, slower times for laps 2 and 3 with a fast time for the final 400m ($F_{3,37} = 35.05$, $p < .001$, Partial $Eta^2 = .74$).

Figure 2: 400m lap times by intervention condition



Discussion

The present study examined the effects of two types of emotion regulation strategies on emotions and performance in 1600m maximal running performance. Previous research has found that emotions influence performance (Beedie et al., 2000; Hanin, 2003, 2010; Lazarus, 2000), with emotion regulation strategies being a common approach to mental preparation (Lane et al., 2012; Wagstaff, 2014). Data indicate that intervention designed to raise the intensity of unpleasant emotion led to increased anxiety and reduced calmness in comparison

to the no-treatment and intervention to reduce the intensity of unpleasant emotion condition. No differences were observed between the intervention designed to reduce the intensity of unpleasant emotion and the no-treatment condition.

During the development of the interventions, participants reported that regulating anxiety via reducing its intensity was a common approach, and therefore it was possible that the no-treatment condition was in fact contaminated with well learned and possibly automated strategies to regulate anxiety. As Stanley, Beedie et al. (2012) report, there are many thoughts and actions that act as emotion regulation strategies which athletes might not recognize as such. For example, warming up is done ostensibly to prepare for physical performance, but in doing so, warming up might increase beliefs in readiness to perform and reduce anxiety. Lane (2001) found that perceived readiness to perform associated with pleasant emotions.

In terms of the effects on performance, results suggest that emotion regulation strategies did not significantly improve or worsen time to complete 1600m, a finding consistent with previous research (Beedie et al., 2012; Wilson et al., 2012). Interrogation of performance involved investigating the effects of emotion regulation on pacing. Wilson et al. (2012) reported an uneven pacing strategy associated with unpleasant emotions. In the present study, the pacing strategy followed in each condition was to run a faster time for the 1st 400m, slower times for laps two and three and a faster time for the final lap (see Figure 2). This approach to pacing is consistent with those reported for successful performance in middle distance performance (Noakes et al., 2009; de Koning et al., 2011; Thiel et al., 2012). However, as Figure 2 illustrates, the emotion regulation strategy adopted appeared to influence the pacing strategy followed. The intervention designed to reduce the intensity of unpleasant emotion was associated with running a significantly slower time for the first lap, and a significantly faster time for the final lap than the other two conditions.

de Koning et al. (2011) reported that setting off fast associates with the highest ratings of perceived exertion. Research indicates that intense fatigue associates with a combination of unpleasant emotions and thoughts that signal stopping or slowing down (Noakes, 2012). Noakes argues that emotions and fatigue act as a safety valve to provide information that the individual is not coping physiologically, thereby prompting a response. Clearly, following this pacing strategy would require participants to have a high level of motivation to try to run fast when experiencing intense sensations of fatigue, and overriding the signal to slow down goes against an evolved mechanism for survival (Baron et al., 2011; Noakes, 2012). We suggest that runners should consider the emotions that they could experience, and intended pacing strategy that they wish follow. Research has previously suggested that high anxiety might associate with physiological responses such as increased ventilation and heart rate which might reduce the overall energy for performance.

The ability to follow a pacing strategy requires self-control and recognition of the effects of emotion on pacing, especially over the 1st part of the run. If an athlete does start fast (Lane et al., 2011; Stanley, Beedie, et al., 2012; Stanley, Lane et al., 2012), then s/he should anticipate that the final part of a run is likely to involve managing high perceived exertion (Baron et al., 2011; Noakes, 2012). The self-regulatory component of this will be important as an athlete makes judgments as to whether performance will meet expectations using ongoing feedback. In the present study, participants had no access to their running time and so relied on ongoing kinesthetic feedback. In the no-feedback condition, Beedie et al. (2012) found that ongoing emotions were similar to those experienced in a negative feedback condition where participants experienced intense anxiety. We suggest that future research should examine the effects of ongoing feedback and assess emotions within performance. The use of pacers would allow runners to control pace in order to counteract the effects of anxiety of pace judgment.

In the present study, we attempted to develop individualized emotion regulation interventions by guiding participants to develop and refine the strategies that they already used (Stanley, Beedie, et al., 2012). This followed a process suggested in a recent review by Lane et al. (2012). The interventions used to guide emotion regulation were developed via electronic communication. This approach minimizes possible practitioner effects (Andersen, 2006). Although not commonly used in sport psychology, evidence from other areas of application lends support to the utility of online support (Gaffiney, Mansell, Edwards, & Wright, 2013). We suggest further research is needed to investigate the efficacy of brief interventions delivered electronically. If such interventions were found to be effective, then it would be possible to provide resources that allow athletes to self-regulate their emotions. Cugelman, Thelwall, and Dawes (2011) argued that with over 2 billion internet users, the potential reach of interventions is huge. The present study represents a start point to that process and future research should look to increase the sophistication of the intervention used and offer standardized feedback (Gaffiney et al., 2013).

A desirable feature of the present study is the use of a quasi-experimental design. A great deal of emotion research has used a correlational design. Michie, Rothman, and Sheeran (2007) examined the utility of research designs to test interventions in health and argued that control group data is necessary to control for effect of intention on behavior. Correlational studies cannot rule out the possibility that intention caused behavior change (Webb & Sheeran, 2006) and a great deal of research on emotion in sport has used a correlational design (Hanin, 2010; Lane et al., 2012). The present study developed an individualized intervention that not only formed part of a scientific study, but also was also useful for participants. The present study tested the effects of the intervention, although an acknowledged limitation is that multiple measures were not used for each condition. We suggest that the method of developing an emotion regulation strategy and testing it in

controlled conditions such as track running, could be something participants could do as a regular part of training.

An acknowledged limitation is the small and heterogeneous nature of the participant sample (in experience and level of performance). We suggest future research should investigate extremes of the population separately. For experienced runners, research should investigate the use and effectiveness of existing self-regulation strategies on managing anxiety and its resultant impact on performance. For inexperienced athletes, research should investigate the effects of anxiety on performance, and explore the strategies people use to manage emotions. Given research evidencing dropout among inexperienced athletes (Dishman, 1982), it would be prudent to examine the extent to which these describe thoughts related to wishing to cease running.

In conclusion, the present study examined the effects of interventions to intensify or dampen unpleasant emotion before running a 1600m maximal time trial. Results show participants could enact interventions to alter anxiety and calmness. It is suggested that future research examines the use of strategies intended to help athletes perform optimally by using a pacing strategy that serves their goals.

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