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REGULATING EMOTIONS TO GO FASTER!

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Introduction

Are there helpful emotions?

People experience a range of emotions but want to feel emotions that they believe will help performance. Sport is an emotion-fuelled environment, whether playing, coaching, or watching. Emotions are subjective feelings experienced in response to events either in the athlete's environment, for example standing on the start line, or in the athlete's mind, such as anticipation of an upcoming event (Lazarus, 2000). Emotions can be pleasant, such as happy and excited, or they can be unpleasant such as sad or angry (Lazarus, 2000). Emotions vary in terms of arousal, for example happiness and sadness associating with low arousal, and excitement and anger associating with high arousal. Emotions usually encompass three types of responses (Baumeister, Vohs, DeWall, & Zhang, 2007; Lane, Beedie, Jones, Uphill, & Devonport, 2012; Lazarus, 2000): physiological, such as changes in respiration and heart rates; cognitive, such as the changes in attention, perception, and information processing priorities; and behavioural, such as staring at an opponent in an attempt to unsettle them, or sprinting at the start of a race due to high anxiety. Athletes experience intense emotions before, during, and after attempts to achieve important goals. Evidence is generally supportive of the predictive effects of pre-competition feelings (Beedie, Lane, & Wilson, 2012; Brick, MacIntyre, & Campbell, 2014, 2015, 2016; Lazarus, 2000).

Emotions can be intense, occupy our minds, change our priorities, alter our physiological states, and guide our learning (Baumeister et al., 2007). Because of these physiological, cognitive, and behavioural processes, emotions can have significant effects on how we perform (Beedie et al., 2012; Wilson, Lane, Beedie, & Farooq, 2012). The link between emotions and performance is most likely

influenced through its effect on goals. With goals being a central part of human behaviour (Locke & Latham, 1990; Mansell, 2005), the relationship between the action tendency and the goal the individual pursues is relevant, and this can influence emotions (Lazarus, 2000). People have a hierarchy of goals; for example, being good at sport could be important to one person, but less important to another (Carver & Scheier, 1990; Mansell, 2005). The nature of sport, being time bound where the start and finish are clearly identified, can influence when a person prioritises the results of competition. At the start of competition, where success in competitive sport is the primary goal, emotions increase in intensity in preparation to meet that challenge. With intense emotions come a shift in priorities and feelings of energy because of changes in physiological arousal, the process of mental preparation involves attempts to create a mindset that engenders a belief that goals will be attained (Hanin, 2010; Lane & Terry, 2000).

Emotions intensify during the build-up to competition. We have argued that researchers and practitioners should use discrete emotions such as anger, anxiety, depression, and vigour (Lane & Terry, 2000), rather than combining discrete emotions into broad hierarchical structures of positive and negative affect (Watson & Tellegen, 1985). Lane and Terry (2000) argued that by examining the affective content of discrete emotions, and examining cognitive processes that accompany them, the interaction between emotions becomes important when looking at how they influence action. If the action tendency associated with the emotion is not congruent with the goal, then this prompts emotion regulation strategies to be used (Hanin, 2010; Lane et al., 2012; McCormick, Meijen, Anstiss, & Jones, 2018; Webb, Miles, & Sheeran, 2012). For example, if an athlete feels sad, where the action tendency is to conserve resources, this is not congruent with a goal of marathon running by exercising intensely for several hours. If an athlete feels sad, but wants to run intensely, then the feeling of sadness will need to be regulated. The same athlete might wish to feel energetic and excited, and so would wish to engage in up-regulation strategies. By seeking to intensify a sense of energy, and engendering a belief that the athlete feels able to perform at the desired intensity, this in turn down-regulates feeling of sadness. In this instance, sadness was experienced via anticipating not achieving important goals.

An aspect of the emotion regulation process is that people hold beliefs about whether emotions are helpful or harmful in terms of helping them achieve their goals (Hanin, 2010; Lane et al., 2012). People evaluate how they want to feel and attempt to employ strategies that will change these feelings (Lane, Beedie, Devonport, & Stanley, 2011; Webb et al., 2012). A key question regularly asked about emotion and performance is 'how should I feel if I want to perform better?'

How should I feel if I want to perform better?

Regulation implies there is a standard to reach. For example, a thermostat regulates heat and once room temperature reaches the required temperature, the heating

turns off. Monitoring the discrepancy between the current and desired standard drives regulation. With emotion, an example of this could mean that a person identifies that feeling excited associates with good performance and then assesses how excited they feel (Hanin, 2010). If they are less excited than they would like, then it would be desirable for them to engage in strategies to increase excitement. However, the notion that people regulate to a standard is important as it implies there is constant monitoring between the current and desired standard, and that people accurately know how they are feeling and how they would like to feel. With emotions, it is possible that neither is correct. Estimates of current feelings are complicated because people do not have perfect access to inner states; the entire emotional intelligence concept (see Petrides et al., 2016 for a review) is predicated on the basis that some people are better at doing this than others. There appears some credibility in the notion that the ability to identify emotions is an ability that differs between individuals. For example, high scores on an emotional intelligence scale related to experiencing pleasant emotions, low fatigue (Lane & Wilson, 2011), and satisfaction with performance (Lane, Devonport, & Stevens, 2010).

Regulating emotions to help performance is also complicated because the direction, whether to amplify or dampen the emotion, is complex. It is not a case that regulation follows a hedonic model of increasing pleasant emotions and reducing the intensity of unpleasant emotions (Hanin, 2010; Lane & Terry, 2000). Research has highlighted that supposedly unpleasant emotions such as anger, anxiety, and tension are associated with good performance (Beedie, Terry, & Lane, 2000; Cockerill, Nevill, & Lyons, 1991; Hanin, 2010). Research has also found that the same emotion is not always perceived as undesirable, and that people wish to use strategies to increase anger or anxiety based on a belief that this will lead to better performance (Hanin, 2010; Lane, Beedie et al. 2011; Stanley, Lane, Beedie, & Devonport, 2012; Tamir, 2016). Researchers have also sought to identify individual zones of optimal functioning and in this work, it appears both pleasant and unpleasant emotions can be helpful for performance (Hanin, 2000).

In summary, it seems clear that the discrepancy between current and preferred inner states drives regulation. With emotions, it seems there is a mixed currency and that some unpleasant emotions can be functional and help performance even though they feel unpleasant. Evidence suggests people learn to appraise emotions (Baumeister et al., 2007; Hanin, 2010; Lane, Beedie et al., 2011) and so if people wish to regulate emotions to help performance, then they need methods to help identify their current emotions and if these differ from the ideal, then they should consider using strategies to regulate emotions.

If I want to regulate my regulation emotions, what should I do?

What is clear from research and practice is that athletes engage in strategies to regulate emotions. Without providing formal psychological skills training to the participants, research shows that athletes use cognitive strategies that resemble

self-talk, imagery, and goal-setting (Stanley, Beedie, Lane, Friesen, & Devonport, 2012; Stevens & Lane, 2001) and use strategies within competition such as listening to music (Lane, Davis, & Devonport, 2011). Research shows that use of psychological skills has positive effects on performance (Thelwell, 2015). Therefore, both emotion and using psychological skills appear to have positive effects on performance. Researchers often assess emotion and psychological skill usage concurrently and then assume the direction of relationship indicates psychological skills usage influences emotion (Gill, Lane, Thelwell, & Devonport, 2011). This is not necessarily the case: experiencing an intense emotion could prompt psychological skill usage. Experiencing an intense unwanted emotion can prompt people to use of regulation strategies (Webb et al., 2012). For practitioners, the commonality and shared variance is less important. Emotions can be regulated via engaging in emotion regulation strategies, and beginning applied work on emotions would seem to be as good a place to start as any. Further, a practically useful way is to investigate the effects of using emotion regulation strategies and psychological skills on emotions to see if there is also an improvement in performance.

In terms of developing experimental strategies to manipulate emotions, our work on the antecedents of emotions in endurance athletes (Lane, Terry, & Karageorghis, 1995a, 1995b; Lane, 2001) and our research into how endurance athletes regulate emotions (Stanley, Beedie et al., 2012) is relevant. Perceived ability, the standard of goal, and course conditions relate to the intensity of emotions, and beliefs that increase the likelihood of goal attainability associate with pleasant emotions. Stanley, Beedie et al. (2012) used an open-ended method to identify what strategies athletes used to regulate pre-competition emotions. They found that cognitive strategies such as self-talk and goals were the most commonly reported. They also found that behavioural strategies such as exercising, talking to others, and distracting yourself, possibly through the use of music, (Karageorghis, Terry, Lane, Bishop, & Priest, 2012) was relevant when regulating emotions. When seen collectively, these results provide a rich evidence base for developing experimental methods to manipulate emotions. They also provide important contextual information on how to manage the environment in which data are collected. As indicated in recent research, the presence of others exercising can influence perceptions of effort (Cohen, Ejsmond-Frey, Knight, & Dunbar, 2010). Our research using a pacemaker as a strategy to help runners achieve their goals and thus manage emotions showed mixed results. Following a pacemaker associated with a reduction in the intensity of unpleasant emotions in some individuals, but an increase in the intensity of the same emotions in others (Fullerton, Lane, & Devonport, 2017). Hence, how you perceive the external environment is important.

Gross and Thompson (2007) proposed a five-category model of antecedent- and response- focused emotion regulation strategies: situation selection, situation modification, attentional deployment, cognitive change, and response modulation (the first four being antecedent-focused; the last, response-focused). Situation selection refers to the process whereby an athlete actively chooses to place him/herself in one situation rather than another. Situation modification refers to

attempts to modify external aspects of the environment. By doing either of these, an athlete may make it more likely that a desirable emotional state is attained or an undesirable one avoided (e.g. walking away from an antagonistic opponent to prevent anger developing, or using humour to diffuse a tense situation). Attention deployment refers to the process whereby an athlete directs his/her attention to influence his/her emotions. That is, when it is difficult to change the situation, the athlete can choose to attend to stimuli that do not negatively impact on emotion (for example, listening to music on headphones to avoid listening to the crowd prior to an event). Cognitive change involves changing the meaning of an event or situation and so it can involve changing an athlete's goals. For instance, an elite runner who has a goal of winning a local race and is expected by others to win and is beaten could re-appraise this as the race being low in importance to them, labelling as a training run, and setting a goal based on self-referenced effort rather than outcome. Response modulation refers to strategies designed to regulate the physiological and cognitive aspects of emotion as directly as possible. Regulating the physiological arousal associated with emotion makes intuitive sense in sport given that optimal arousal levels will vary substantially between endurance events, from the low arousal associated with long endurance events such as a marathon. The process model is appealing for use by practitioners as it provides a theoretical framework to guide work. Anticipating likely emotions and developing a plan to re-appraise the meaning has been found to be effective in running (Lane, Devonport, Stanley, & Beedie, 2016) using an if-then plan (see Wolff, Bieleke, & Schüler, 2019).

What happens to performance when emotions are manipulated or regulated?

More recent work has manipulated environmental cues to manipulate emotions (Beedie et al., 2012) or investigated the effects of interventions to change emotions (Lane, Davis, & Devonport, 2011; Lane et al., 2015; Lane et al., 2016). Beedie et al. (2012) investigated emotion regulation in cycling. This project was developed as an extension of a study which found riders who reported negative emotions when riding at lactic threshold for 2 hours experienced a significant change in physiological responses to that exercise in the form of increased ventilation rate (Lane, Wilson, Whyte, & Shave, 2011). Lane, Wilson et al. assessed emotions using the Brunel Mood Scale (Terry, Lane, & Fogarty, 2003) before and after every 30 minutes during cycling on an ergometer. Lane, Wilson et al. found that riders experiencing unpleasant emotions also experienced greater physiological disturbance, particularly breathing faster and harder. However, from these results, we do not know the direction of changes in respiration and changes in emotion. It is possible that feeling fatigued and increased breathing associated with an increase in unpleasant emotions and, therefore, emotions were responses to the change in physiological states. It was also possible that unpleasant emotions signalled that the participant was struggling to meet the demands of the ride, and

emotions were a trigger to breathing harder and thus, increasing respiration would enable riding to feel doable and thus regulate emotion.

Feedback can also influence emotions. Beedie et al. (2012) set out to increase the intensity of emotions during a 10-mile cycle ergometer ride by using false feedback. Beedie et al. gave riders false positive or false negative feedback after each mile. They found false negative feedback associated with intense unpleasant emotions, coupled with significantly higher blood lactic, and greater oxygen usage. Differences in performance were not significant and with a very small overall mean difference. However, how power was produced in the ride was different between conditions. In false negative feedback, riders sought to get back to a pace that would deliver their goals by increasing force on the pedal and this yielded large power spikes in the data, which associated with high lactic acid and oxygen uptake. In contrast, a similar finish time and average wattage use was delivered with a lower oxygen uptake, suggesting that pleasant emotions associated with improved economy, a characteristic that would seem desirable for endurance performance. The response to being behind the performance goals was to produce a surge of effort, but one that was not sustainable and so a dip in watts followed shortly. It is worth noting that differences in performance were driven by the athlete's response to environmental information. Although conducted in a laboratory, there are similar thought patterns in in naturalistic settings, where riders make similar evaluations in conditions far from optimal with the main contenders being the effects of wind, hills, and other riders. The implications from this study suggest that positive perceptions of progress during a race help maintain positive emotions and the behavioural reaction to such as strategy is to ride smoothly, a strategy that delivers an efficient performance.

Our research group followed this study by examining the effects of interventions designed to increase pleasant emotions or increase unpleasant emotions on 1600m running time (Lane et al., 2015). Runners were supported to develop interventions using cognitively based methods including imagery and self-talk. We found that increased anxiety associated with running a fast first lap, slowing and then speeding up for the final lap. In contrast, increasing pleasant emotions associated with three evenly paced laps and speeding up for the final lap. As with Beedie et al. (2012), pleasant emotions associated with faster performance over the final stages. However, as with Beedie et al., there was no difference in overall performance. A consistent feature of the two studies is the notion that unpleasant emotions appear to associate with requiring greater demands in managing effort, results that have implications for performance.

In terms of future research, recent work has found that active training delivered online can help change emotions and improve performance (Lane, Totterdell, et al., 2016). In a study of 44,000 participants, Lane, Totterdell et al. compared and contrasted 12 different interventions including three different techniques (imagery, self-talk, and if-then planning) and four different foci (motivation process, motivation outcome, instruction, and arousal-reduction). They also included a control condition where participants received an informational film in which

they were advised to perform the task again, but given no specific guidance on how to improve. All interventions were delivered via watching an instructional film acted and narrated by Olympic Gold Medallist Michael Johnson. Thus, all 13 conditions benefited from the possible positive and motivational effects of receiving encouragement from a potentially inspiring sportsperson. Participants signed up to the project on the basis that they believed they would receive an intervention and were provided with personal feedback from Michael Johnson. The implication from this study is that it is possible to deliver brief active training online, online training leads to changes in emotions in line with theoretical predictions, and such a method offers the potential to overcome challenges of small sample size often seen in other intervention studies (Cugelman, Thelwall, & Dawes, 2011). Few studies, however, compare and contrast the effect of different interventions. Lane, Totterdell et al. (2016) found that self-talk and imagery focused on motivational process associated with an increase in pleasant emotions and improved performance. Such a result is not remarkable, but of greater significance is the fact that active training was delivered online and therefore the reach offered by such an approach is huge. The findings from this study could be used to create interventions for endurance performance; short term outcome focused goals increase emotional arousal and effort, and these associated with faster performance.

In a prequel study to Lane, Totterdell et al. (2016), Lane, Devonport et al. (2016) conducted an online intervention in conjunction with the running magazine, *Runner's World*. Lane, Devonport et al. found performance was significantly better and emotions more positive after the intervention. However, there were two intervention groups and an active-control group, and thus, the intervention training groups were not significantly more advantageous than the control. There were no differences in the effectiveness between an emotion-focused goal intervention, an implementation intention (if-then plan) (Gollwitzer & Sheeran, 2006) and a control condition which encouraged people to do the same emotion regulation strategies they were already doing. Consistent with the approach used by Lane, Totterdell et al. (2016), the control condition involved active training. Consistently, when participants are offered a treatment which they believe will be effective, positive effects are observed. Whereas such a finding might appear unusual or difficult to explain, it is consistent with a wealth of research that has studied placebo effects (Beedie & Foad, 2009). Beedie et al. (2012) have shown that holding a positive belief leads to different outcomes than holding a negative belief even when participants receive the same treatment. And so if all participants receive active training, and 50 per cent of them receive information that endorses the effectiveness of the treatment and 50 per cent are told the treatment is questionable, then these beliefs will play out in the results. Therefore, research that compares interventions that have active training in the control group offer worthwhile findings. Of note, Barwood, Corbett, Wagstaff, McVeigh, and Thelwell (2015) found motivational self-talk associated with improved performance via increased power output. Importantly, Barwood et al. used a 'sham' self-talk intervention, that is, athletes engaged in self-talk that had no theoretical reason to be effective other

than participants were aware of an intervention. Online interventions are proposed to be a growing area of applied work and research and facilitated by a number of useful websites such as mood online (http://www.moodprofiling.com/) which allows people to check their mood profile against normative data.

Conclusions

Athletes experience intense emotions before, during, and after competition and emotions provide information on self and the environment. People like to feel emotions that are useful and that will help achieve their goals. Emotional profiles associated with success vary between individuals. In endurance sport, cognitive strategies such as goals, imagery, and self-talk are commonly used by athletes. Intervention work to change emotions has generally supported that teaching usage of these emotions brings about changes in emotions. Whilst emotions have changed, this has not been followed by changes in performance. In terms of how to teach emotion regulation strategies, recent research shows the benefits of online training. Online training has huge potential reach and thus enable wide scale usage and so have potential impact and from this, the capability to test competing interventions.

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