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Abstract

This study examined the emotions experienced by a team of 12 military personnel during a two-month Antarctic mountaineering expedition, the strategies these individuals employed to manage these emotions, the perceived effectiveness of these strategies, and the impact of such strategies on team dynamics and performance. To address the research aims, participants completed daily diaries with standardized checklists throughout the expedition and took part in pre- and post-expedition semi-structured interviews. The data showed that participants experienced a broad range of discrete emotions and reported similar frequency of use of adaptive and maladaptive emotion regulation strategies. Surprisingly, two maladaptive strategies, acceptance and expressive suppression, were rated as the most effective regulation strategies despite their use being correlated with negative intrapersonal and interpersonal outcomes. The results confirm the complex social nature of the emotion process and illuminate our understanding of emotional experiences in performance teams. The findings support the existence of affective linkages between team members and highlight the importance of emotional contagion and labor for intrapersonal and interpersonal outcomes.

Keywords: emotional contagion, emotional labor, performance, team dynamics, Antarctic, mediation, mental fatigue

Examining emotion regulation in an isolated performance team in Antarctica

Much of the literature written about extreme environments typically begins with a taxonomy of their harsh environmental characteristics. Indeed, the Antarctic is the highest, driest, coldest, windiest and least accessible continent; the only one with no land fauna and very few indigenous flora. Since its discovery, no historical evidence has been found that indicates permanent human settlements, and survival is possible only if complex technological support is available and in good working order. Given this extremis, there is a long history of carrying out research and surveys on the frozen continent. Specifically, researchers have regularly highlighted the great value of scientific research examining the psychological, social, and cultural factors for the human adjustment process in this isolated environment (e.g., Lantis, 1968; Law, 1960; Levesque, 1991; Palinkas, 1986; Suedfeld, 1991; Wood Hysong, Lugg, & Harm, 2000). For example, researchers have found interpersonal conflict and tension as the most significant sources of strain in polar environments (e.g., Palinkas & Suedfeld, 2008). Moreover, the effect of conflict has been purported to result in decreased group cohesion and well being, in addition to increased psychological problems (Paul, Mandal, Ramachandran, & Panwar, 2010). Therefore, given the isolated nature of, and ubiquitous threat to, human life in polar environs, Antarctica offers an ideal natural laboratory to study emotional responses to such stressors and their impact on group dynamics and performance. For example, meta analyses have highlighted the importance of high group cohesion (see Evans & Dion, 1991) and minimal relationship and task conflict (see De Dreu & Weingart, 2003) for team performance and team member satisfaction. Hence, examining how the emotional experience and associated behavioral responses of isolated groups in the Antarctic, might provide an insight into how best to optimize performance and, more importantly, survival in isolated and extreme domains.

Emotions are a common feature of our everyday lives which are essential for human survival due their importance in attaching salience to goals and influencing cognition,

decision-making, and action in response to environmental demands. Emotions are understood here as a relatively brief valenced response to events individuals evaluate as offering important threats, harms or challenges, which is distinguishable from feelings (the subjective experience associated with an emotion), mood (an emotional state that is general and extended in time) and affect (an umbrella term encompassing feelings, mood and emotion) (cf. Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). Humans have demonstrated an evolved ability to modify and control virtually every aspect of the emotion process (Koole, 2009). Such regulatory foci include selection of or modification of one's environment, the attention one devotes to stimuli, how one evaluates or appraises a given situation, and how individuals express the emotions they experience (Gross, 1998a). The process by which people manage their emotions is referred to as emotion regulation and has been associated with mental (Gross & Muňoz, 1995) and physical (Sapolsky, 2007) health, relationship satisfaction (Murray, 2005) and work performance (Diefendorff, Hall, Lord, & Strean, 2000).

Gross's (1998a) process model of emotion regulation assumes that emotions are generated in a sequence of four stages which can be targeted for regulation (see Figure 1). In the first stage, individuals encounter a situation that can potentially trigger an emotional response. In the second stage, people may or may not deploy attention to the emotion-relevant aspects of the situation. In the third stage, individuals generate cognitive appraisals of the situation that may or may not lead to an emotional response. In the fourth stage, people express their emotions as overt behaviors. Research generally indicates that antecedent-focused strategies (e.g., cognitive change) employed earlier in the emotion-generative process are more effective and less effortful than response-focused strategies (e.g., response modulation) aimed at regulating emotional expression later in the process (Gross, 1998b; Richards & Gross, 2000). Indeed, findings suggest that experimentally-induced suppression of negative emotion can effectively reduce emotion expression, but not reduce the subjective feeling (i.e., intensity) of the emotion suppressed, and such regulatory behaviors incur a cost

of increased physiological response and cognitive impairment (Ehring, Tuschen-Caffier, Schnülle, Fischer, & Gross, 2010). Moreover, the suppression of negative emotion has been related to more negative mood, worse interpersonal functioning, and higher levels of psychopathology, whereas the opposite has been shown for antecedent-focused strategies such as reappraisal (Gross & John, 2003). Conversely, regulation strategies aimed at affecting the perception and processing of emotional cues at the onset of an emotion (i.e., reappraisal), have been shown to effectively reduce both expression and experience of emotion without negatively impairing physiological or cognitive functioning (e.g., Gross, 1998b; Kross, Ayduk, & Mischel, 2005). Recently, some researchers have asserted that the process model may underestimate the complexity of emotion regulation strategies (see Koole, van Dillen, & Sheppes, 2011), raising doubts over the notion that emotion regulation through cognitive change strategies (i.e., those assumed to target earlier components of the emotion process) are inherently more effective than response modulation strategies (i.e., those assumed to target later components of the emotion process). Given these assertions, other researchers have focused their attention to distinguishing between adaptive (e.g., putting into perspective, refocus on planning, positive refocusing, positive reappraisal) and maladaptive (e.g., acceptance, catastrophizing, rumination) cognitive emotion regulation strategies (Garnefski, Kraaj, & Spinhoven, 2002). In line with this literature, emotion suppression should be considered a maladaptive response modulation strategy (Suri, Sheppes, & Gross, 2011) that, in addition to maladaptive cognitive strategies (e.g., rumination, catastrophizing), might be compared with adaptive cognitive change strategies (e.g., reappraisal).

In addition to the core processes by which individuals engage in emotion regulation, scholars also acknowledge varying psychosocial antecedents for these strategies. For example, a substantial body of literature has shown individuals to amplify, fake, or suppress emotions to modify their emotional expression for interpersonal outcomes (see Grandey, 2000). This process has been referred to as emotional labor (see Grandey, 2000) and

varyingly conceptualized as the management of emotional expression in line with social display rules or a dissonance between required and felt emotions. A recent meta-analysis found that surface acting (a form of emotional labor involving the expression of unfelt emotions) is directly associated with psychological strain, a lack of personal accomplishment, depersonalization, emotional exhaustion, and reduced job performance (Hülsheger & Schewe, 2011). English and John (2013) recently examined the mechanisms underlying these social effects of emotion regulation and found the social costs of suppression (e.g., lower relationship satisfaction and social support) to not be due to reduced positive emotion expression but rather the incongruence between inner-self and outer-behavior.

In line with the prevalence of emotional labor in social groups, anecdotal accounts of leaders of Antarctic expedition teams indicate a substantial need to manage their emotions during lengthy periods in close proximity with teammates (e.g., Fiennes, 2004). These emotions fluctuate unpredictably between the periods of extensive physically demanding mountaineering and the monotonous sedentary periods spent in tents. However, whilst extant research findings have undoubtedly enhanced our understanding of the interplay between emotion regulation and our social environment, there remains significant scope for further inquiry in this area. Indeed, beyond examining the antecedents of emotional labor, there is a dearth of research examining how individuals manage their emotions in psychologically and physically demanding environments or how these behaviors impact social functioning or human performance. Further, team members' momentary emotional states are not independent from those of their team members because these states and experiences are mutually shared within the team. In extreme environments, this interdependency is accentuated where success or failure, which in some instances equates to life and death, are shared by all team members. That is, because members of highly interdependent teams work closely and share the same task elements (i.e., performing similar tasks with overlapping roles and goals), instances of positive and negative emotion are likely to influence the

emotional states of team members. Ilies, Wagner and Morgeson (2007) stated that such highly interdependent settings provide an ideal context for implicit and explicit affective transfer processes. One example of this interpersonal transference of affect through which a person "catches" another's emotions has been labeled emotional contagion (see Hatfield, Cacioppo, & Rapson, 1994).

In line with the potentially fruitful examination of emotion-related concepts associated with performance and survival in Antarctic teams, the aims of the present research were firstly to provide an overview of the type, frequency and intensity of emotions experienced during a two month Antarctic expedition. Secondly, to better understand the strategies individuals employ to manage these emotions and finally, to identify the perceived effectiveness of such strategies. Thirdly, we examined any potential outcomes (e.g., emotional labor or contagion, performance evaluations, and group dynamics). In doing so we hoped to extend research on emotion regulation and associated social processes in groups operating in isolated and extreme performance environments and provide practical information that could inform preparation for, and performance in, such environments. To our knowledge, this is the first performance psychology research to sample serving personnel during a military operation. We believe that sampling military performance teams and individuals operating in extreme environments can provide a rich insight for many under-researched performance domains (e.g., flight crews, emergency services, oil industry workers, surgery teams) as well as those commonly examined within performance psychology (e.g., sport, business, and performing arts).

Method

Methodological Approach

Issues relating the stress and emotion in performance environments are complex. Hence, combining the strengths of qualitative and quantitative approaches offers an excellent approach to facilitating a fuller insight into these processes and their impact of team and

performance outcomes over an extended period of time. While pre-and post-expedition interviews can illuminate participants' expectations and reflections regarding their experiences, qualitative narratives and quantitative questionnaire daily diary data might provide an insight into experiences at the time or close to their occurrence. Therefore, such a combined approach might provide an understanding that might be missed through using a single method (Creswell, 2013). Mixed methods can also strengthen evidence through confirmation, substantiation, and by neutralizing each others' biases or weaknesses (Creswell, 2013)

Participants and Expedition Details

Following an application procedure two years prior to departure 176 individuals were invited to form a training squad. Over the following two years the squad members were expected to attend specific training weekends to demonstrate and improve generic climbing, skiing and mountaineering skills. Six months prior to departure, a final team of 24 members was selected based on a combination of commitment, training attendance, specific skills and mountaineering qualifications. Twelve of the expedition party members were allocated to this study, with the remainder allocated to a similar, but independent research project.

The expedition party members allocated to this study comprised 12 experienced British mountaineers (mean mountaineering experience 13 years), the majority of which had no polar experience (11 male and 1 female; mean age 36 years). The team accessed the Antarctic Peninsula and once ashore the team concentrated efforts on traversing the Avery Plateau by man-haul and subsequently descend onto the Larsen ice shelf to conduct scientific research, while also attempting first ascents of mountains in the area. The expedition, which was supported at sea by the Australis, lasted 43 days over the months of January and February 2012 where air temperatures ranged from 0^{o}C to -12^{o}C. The support team successfully ascended over 25 previously unclimbed mountains whilst exploring a dangerous coastal region.

Data Collection

Following institutional and Ministry of Defence ethical approval, we employed a mixed method approach to collect data across pre-, during, and post-expedition phases to address the research questions. That is, data were collected in three temporal phases: pre-expedition, during-expedition, and post-expedition using a combination of semi-structured interview and daily diary methods.

Interviews. We adopted a semi-structured qualitative interview approach (Gubrium & Holstein, 2002). Interviews were conducted with all participants no more than 2 weeks before and no more than 2 weeks after the expedition (i.e. following extraction from the Antarctic Peninsula). The pre-expedition interviews lasted between 34 and 89 minutes (M = 58.01, SD = 21.88), with post-expedition interviews lasting between 47 and 210 minutes (M = 86.21 minutes, SD = 42.16). The post-expedition interviews were longer in duration given their focus on participants' rich experiences and stories rather than *a priori* expectations and plans. Inter views were conducted in person or via telephone by the first author trained in qualitative methods to postgraduate level and were all recorded via Dictaphone and later transcribed verbatim.

Interview guides. Two semi-structured interview guides were developed for the pre- and post-expedition data collection phases. The guides were not rigid documents but a flexible set of questions which varied with the flow of the discourse and allowed both the interviewer and interviewee opportunity to explore all salient topics as they arose (Patton, 2002). The questions were informed by relevant emotion regulation literature from performance environments (e.g., Wagstaff, Fletcher & Hanton, 2012a; Wagstaff, Fletcher, & Hanton, 2012b). Probes were used throughout the interviews to gain further information regarding participant experiences and to clarify areas of relevance to the research question. Both interview guides were piloted with expedition reserve members prior to the data collection period commencing with only superficial and question order changes being made.

The pre-expedition interview guide was intended to facilitate discourse relating to the emotions participants anticipated experiencing during the expedition and their preferred and intended strategies to manage these. The pre-expedition interview guide had five sections.

The first section aimed to elicit background information about the interviewee including age, rank, service, and expedition experiences in extreme environments. Participants were also invited to outline the expedition plans and their identified role(s). The second section attempted to unearth the participants' perceptions of the likely demands of the expedition (e.g., "What do you anticipate being the main mental, physical and technical challenges/demands that you'll face on the expedition?") and any steps they had taken to prepare for these (e.g., "How have you prepared for these challenges/demands?"). The third section invited participants to consider if they anticipated any situations in which they would need to manage or regulate their emotions during the expedition ("In what situations do you anticipate you'll need to manage your emotions during the expedition?"), their preferred strategies (e.g., "What strategies do you intend to use to manage emotions?") and how effective they thought these strategies would be (e.g., "What do you think is the most effective way of managing emotions during expeditions in extreme environments?"). Section four encouraged participants to consider how they might help their teammates manage their emotions (e.g., "To what extent do you feel that you will need to help your team mates manage their emotions?") and how (e.g., "What strategies do you anticipate using to help your team mates manage their emotions?"). The final section provided opportunities for the participants to provide any further comments and the researcher to use probe and elaboration questions.

The post-expedition interview guide had five sections. The first section provided participants with a recap of their pre-expedition expectations and a summary of their diary entries. The second section invited participants to reflect on the actual factors that positively or negatively influenced the success of the expedition as well as the main mental, physical

and technical challenges/demands that they faced on the expedition. The third section requested the interviewee to outline the situations in which they needed to manage or regulate their emotions during the expedition, their perception of the effectiveness of these strategies ("How effective do you think these strategies were?"), how their experiences compared to their pre-expedition anticipations (e.g., "How did this compare to how you intended to manage emotions in these situations?"), how effective they perceived these emotion regulation strategies to be in their given situation and what advice about regulating emotions they would you give to future expedition parties. The fourth section asked participants to reflect on the situations they found themselves helping teammates manage their emotions, how effective they perceived these efforts to be, and how this compared to their pre-expedition expectations and intentions. The final section allowed participants to provide advice for managing emotions in extreme environments and offer final comments.

Daily Diaries. Participants were provided with a diary booklet that consisted of a guide to completing the diary prompts and multiple diary pages. Bolger, Davis, and Rafaeli, (2003) have argued that the daily diary can provide a real time record of participants' experience in a natural, spontaneous context, therefore, offering an excellent compliment to traditional designs in psychology (e.g., interviews). Further, it was hoped that the mixed method approach would promote prolonged engagement, trustworthiness in the data, and greater interaction between the data collection and the analysis phases of the study (cf. Bolger et al., 2003; Patton, 2002; Wagstaff et al., 2012b). Finally, the diaries were used as a mechanism for facilitating discussion during the post-expedition interviews.

Each participant was given a paper and pencil booklet containing a diary page for each day of the expedition (including travel from and to the United Kingdom). Diary pages contained a short questionnaire and space for additional thoughts. Diaries were completed by participants at the end of each day and took approximately 10 minutes.

The questionnaire had four sections. The first section asked participants to provide general information about the temperature, how many hours they had slept in the past 24 hours, whether they had suffered from illness or injury in the past 24 hours, and roughly how many hours they had spent physically active in the past 24 hours. These measures have previously been used in similar extreme environmental psychology research (see for review Weston, 2011). Section two of the questionnaire requested participants to indicate how they had felt over the past 24 hours on a 10-point counter loaded bipolar scale. In line with the scale used by Weston (2011) the items referred to eating/hydration, depression, loneliness, mental fatigue, physical fatigue, anxiety, comfort, confidence in duties, and rating of task and social cohesion. Section three requested participants to state the emotion they had experienced most that day and provide an intensity value out of 10 (1 = not intense, 10 = very intense) for their emotional experience. Participants were then asked to indicate which, if any, emotion regulation strategies from a 11-item checklist they had employed to deal with their most common emotion and how effective they perceived this strategy to be on a 10-point Likert scale (1 = not effective at all, 10 = very effective). The checklist consisted of nine items from the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski et al., 2002) and two items adapted from the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). The CERQ measures nine dimensions: Rumination, catastrophizing, self-blame, other-blame, acceptance, positive reappraisal, putting into perspective, positive refocusing, and planning. Self-blame, refers to thoughts of putting the blame of what you have experienced on yourself; Other-blame, refers to thoughts of putting the blame of what you have experienced on the environment or another person; Rumination or focus on thought, refers to thinking about the feelings and thoughts associated with negative aspects of an event; Catastrophizing, refers to thoughts of explicitly emphasizing the terror of what you have experienced; Putting into Perspective, refers to thoughts of brushing aside the seriousness of the event/emphasizing the relativity when comparing it to other events;

Positive Refocusing, refers to thinking about joyful and pleasant issues instead of thinking about the negative aspects of an event; Positive Reappraisal, refers to thoughts of creating a positive meaning of an event in terms of personal growth; Acceptance, refers to thoughts of accepting what you have experienced and resigning yourself to what has happened, and; Refocus on Planning, referring to thinking about what steps to take and how to handle a negative event.

The ERQ measures two dimensions: Experience reappraisal (hereafter reappraisal) and expressive suppression. The items used here for reappraisal ("I changed the way I was thinking about it") and expressive suppression ("I made sure not to express the emotions I was feeling and suppressed them") had the suffix adapted to better reflect state (i.e., emotions experienced that day) rather than trait (i.e., how participants generally responded) responses. Section four of the diary invited participants to evaluate their own performance and their team's performance and social and task cohesion on 10-point Likert scale (1 = very poor, 10 = very high) and the perceived impact their emotion management strategy had on these factors (1 = low impact, 10 = high impact) in an attempt to ascertain the impact of emotion experience and regulation on key performance and team dynamics variables.

Data Analysis

Qualitative interview transcripts and diary entries were subject to content analysis (see Miles & Huberman, 1994; Tesch, 2013). The goal of content analysis is to provide knowledge and understanding of the phenomena under study by representing participants' responses in a coherent form (Tesch, 2013). The advantage of traditional content analysis lies in gaining direct information from participants without imposing preconceived theoretical perspectives. The analysis process began with the researchers independently reading all data on several occasions to achieve immersion and obtain a sense of the whole (Tesch, 2013). Sections of the data that appeared to capture meaningful thoughts or concepts regarding emotion experience, emotion regulation, team dynamics or performance were then

highlighted. The researchers then attached preliminary codes (i.e., notes and labels) to these potentially meaningful sections of text during a repetitive and emergent coding process (see Miles & Huberman, 1994). Once all transcripts had been coded, the researchers jointly compared and contrasted their emergent themes relating to the research questions. At this point no major areas of difference were identified, but some of the final codes were combined at this point. The qualitative findings might be judged according to the eight markers of quality research outlined by Tracy (2010), which relate to (a) worthy topic, (b) rich rigor, (c) sincerity, (d) credibility, (e) resonance, (f) significant contribution, (g) ethics, and (h) meaningful coherence. In line with these criteria, the present research might be deemed a worthy topic because of its relevance, timeliness, significance, and interest. The markers of rigor were pursued here by devoting substantial time, care, and thoroughness in data collection and engaging in participant debriefing (Tracy, 2010). Sincerity was pursued through attempts to emphasize the transparency and trustworthiness of the analysis process. In attempting to enhance credibility, we used "critical friends," and multivocality of participant quotations. We attempted to promote resonance by presenting data using visual representations and rich quotations in the hope of allowing participants' complex experiences to emerge, yet leave it to the reader to decide the extent to which the content overlaps with their own experiences. In evaluating the significance of contribution of the research, one might consider the theoretical, heuristic, and practical relevance of the findings. Attempts were made throughout the research process to adhere to procedural, situational, relational and exiting ethical obligations (cf., Wagstaff et al., 2012b). In an attempt to achieve coherent we feel that the study achieved its stated purpose, used methods and representation practices that matched the domain and research paradigm, and attentively interconnected extant literature. Quantitative diary data were analyzed using a combination of Pearson's correlations, t-tests, and mediated regression analysis using PASW 18.0.

Results

The findings presented reflect data collected from pre- and post-expedition interviews and daily diaries. The results are divided into 4 sections. The first section provides an overview of participants' anticipated emotions prior to departure and the type, frequency and intensity of the emotions they actually experienced during the expedition. The second section states the emotion regulation strategies reported by participants. The third section presents the findings relating to the participants' perceptions of the most effective strategies for managing the emotions they experienced. The final section presents findings relating to the impact of emotions and emotion regulation on group dynamics and performance during the expedition.

Anticipated Emotions and Planned Regulation Strategies

The participants anticipated experiencing a range of basic emotions similar to those actually experienced during the expedition, with the most commonly cited being happiness, excitement, frustration, and boredom. The team exuded an air of confidence, readiness and excitement prior to departure with only a few participants anticipating a mixed emotional experience, based on previous experience. One participant stated his expectations:

> I think there will be quite a range of emotions. I'm certainly expecting to have a massive amount of sheer pleasure at being in the mountains. I think I will enjoy myself. I think there will be fear at times although it's quite a good thing to have fear. I'm certain to miss home a little bit. The emotion that I am worried about is anxiety.

In preparing for the expedition, the participants reported largely similar preferences regarding how they intended to regulate their emotions during the expedition. These typically aligned with what they perceived to be globally effective strategies that could be applied across life domains and were likely influenced by past experiences and personality. However, the party members had large disparities regarding how they intended to manage emotions associated with interpersonal conflict. Participants appeared to align with one of two approaches; those who advocated proactively addressing conflict as soon as possible and those who anticipated the importance of suppressing their emotions.

Several participants expressed a preference for suppressing emotions in order to avoid conflict and promote "happy families", with one participant stating:

> Having a happy team and avoiding conflict is so important because discontent and conflict just suck the life blood out of trips. The worst thing that I am really desperate to avoid is the sort of whispering discontent where no one is prepared to stand up and to be honest and say, 'I'm not happy, this is going wrong, I don't want to do this.' Conflict could be devastating… I can't afford to have an assassin in one of the groups poisoning the rest of the team. It's about honesty as well, but it's also about controlling your emotions and that's really important. I suppress my emotions a lot, when what I really want to do is go up and punch someone.

Other team members stated being, "quite good at staying quiet; I just shut up and get on with it". A teammate added, "you need a bit of stoicism to temper that gushing outflow of emotion". Rather than adopting a Stoic approach to emotion regulation, other participants indicated a preference for and perceived importance of airing any negative feelings:

> You've got to be open with each other because you're going to be with them 24/7. I think it's better to clear the air early on rather than just let something build up; certain things snowball suddenly and become big things if they don't get addressed.

Type, Frequency and Intensity of Experienced Emotions

In line with pre-deployment interview expectations, participants reported a broad range of discrete emotions (n = 25) during the expedition (see Table 1). In total, 414 emotion experiences were reported by the participants, of which 238 (57.49%) were positively and 176 (42.51%) negatively valenced. Diary data indicated that the most frequently cited emotions were: Happiness (41.06% of all emotions reported), anxiety (7.73%), contentment (5.80%), boredom (5.31%), anger (5.07%), relief (4.83%), pride (4.35%), and fear (4.35%).

In addition to the generally positive emotional experience reported, the findings indicated that participants perceived themselves to have responded well to the environmental

conditions, reporting high mean ratings for self confidence (M = 8.35, SD = 1.72), motivation (M = 6.04, SD = 1.83), comfort (M = 7.38, SD = 2.04) and low mean ratings of loneliness (M = 2.74, SD = 1.34) and depression (M = 2.41, SD = 1.40) for the duration of the expedition. Interview data supported these objective findings, with participants describing a positive emotional experience, "it was like a private expedition on steroids! That makes me feel very privileged", "the strongest emotion I felt was the happiness and joy of succeeding on things", "it's like you're a kid in a sweet shop and you have got free reign, what do you go and do first?". However, others were more balanced in their reflections recalling "highs and lows" and portraying a mixed emotional experience during "a rollercoaster expedition". One participant added:

> Overall the expedition was very successful. We achieved all of our objectives. We climbed a whole bunch of unclimbed mountains, everybody came back safely and the vast majority of people have had a positive experience. However, the incidents with a few individuals had the potential to really undermine the expedition's success. They put people's lives at risk and I had some huge concerns while I was out there.

Indeed, despite the general *a priori* confidence of the team and limited expectancy of negative emotion, many participants returned from the expedition reporting surprise at their emotional experiences in response to adverse team dynamics:

> The biggest thing that got me was the team's dynamics; you just have to experience it. It just didn't work out how I thought it was going to. I was wrong on some of the things I expected.

Emotion Regulation Strategies Used

Emotion regulation strategies were typically used to manage negative emotions with a range of adaptive (e.g., putting into perspective, refocus on planning, positive refocusing, positive reappraisal) and maladaptive (e.g., acceptance, expressive suppression, catastrophizing, rumination) strategies reported. The emotion regulation strategies used most

frequently were; expressive suppression (N = 67, M^{use} = 9.57, SD = 4.43), rumination (N = 56, M^{use} = 8.00, SD = 3.96), positive reappraisal (N = 56, M^{use} = 7.57, SD = 4.34), self-blame (N = 49, M^{use}= 7.00, SD = 3.21), and acceptance (N = 44, M^{use} = 6.29, SD = 5.77). A repeated measures t-test revealed a non-significant difference between adaptive (M = 34.57, SD = 6.64) and maladaptive regulation strategy use (M = 29.86, SD = 11.71), $t(10) = .497$, p = .637. Post-expedition interviews supported these data, with participants highlighting the need to initially suppress negative emotions and engage in further appraisal before acting in order to optimize emotion-related communication and team dynamics:

> I would definitely deal with the mental pressures in much the same way as I did. With difficult situations, repress any desire to get angry with others at the time, give myself time to think, but ultimately, once I had made a measured decision about it, I would express it.

Perceived Effectiveness of Emotion Regulation Strategies

The participants generally perceived the regulation strategies they employed to be only moderately effective (M = 4.75, SD = 1.27, see Figure 1). A repeated measures t-test revealed a non-significant difference in ratings of effectiveness for adaptive (M = 5.37, SD = 2.21) and maladaptive emotion regulation strategies (M = 4.47, SD = .75), $t(10) = -1.62$, p = .14. Participants reported the most effective strategies to be acceptance (M = 7.19, SD = 2.29) and expressive suppression (M = 6.21, SD = 1.67). The strategies rated as the least effective by participants were catastrophizing (M = 2.72, SD = 1.10) and rumination (M = 2.51, SD = 1.37). Post-expedition interviews also highlighted expressive suppression and acceptance to be viewed as effective strategies by many of the team, who generally believed that expressing negative emotions would be detrimental to team morale. One participant referred to using this strategy directly, “on the whole, I engaged in quite a bit of self-control”, with several others associating this self-control with self-awareness when regulating emotions, “when there were

emotional difficulties everyone in [my section] was in control of their emotions, they were self-aware enough to put their issues aside and control it".

Despite team members collectively asserting the necessity of using expressive suppression during deployment, many participants also reported encountering difficulties in successfully using this strategy. To elaborate, one participant who experienced unexpected interpersonal conflict during the expedition asserted, "I found myself with a limited capacity to hold back my feelings in a massive way. I'm good at staying quiet… I'm not a very confrontational person, but I've never been in a position where it's been so prolonged". Other members of the team also commented on the difficulties of using suppression strategies to regulate emotions during the expedition, stating, "when you're living in a space the size of a toilet for that period of time you can't pretend... you can't keep a visage up for that period, in that kind of environment". Another stated "I've realized is that I'm too task-focused and I need to know more about the team, because the team is what achieves the task… I've become more self-aware but that's not always easy when you're under pressure". Further, regular use of expressive suppression appeared to have negative intrapersonal and interpersonal consequences, as one participant reflected on an incident of conflict caused by emotion regulation failure in a post-expedition interview:

> It provoked an absolute explosion. Total mayhem. Ranting. Shouting. Wild accusations in front of everyone. Unbelievable. He was getting all his frustrations out, all that had been bubbling up, all those interactions with me, all the stuff he'd been suppressing. This is it, suddenly the dam has burst and it all comes out in rants.

Another participant expressed the contagious effect of a teammate's emotional expression:

> I think [teammate] being vocally negative had a big effect; it was fairly contagious and built up very quickly. One person moaning or whining brings everybody down… It makes a difference because people copy it without even realizing; someone who is outwardly expressive all the time is very strongly felt by the group and that rubs off.

Impact of Emotions and Emotion Regulation on Team Dynamics and Performance

Although mean social (*M* = 8.39, *SD* = 1.33) and task (*M* = 6.44, *SD* = 1.61) cohesion were high for the expedition, daily diary data indicated that the participants' emotional experience impacted perceptions of task and social cohesion and team performance. To elaborate, there was a significant difference in task cohesion on days when a team member reported anger (*M* = 7.25, *SD* = 1.19) and contentment (*M* = 8.55, *SD* = .59), *t*(9) = -4.57, *p* = .001. Participants also reported significantly lower levels of social cohesion on days when a team member reported their most prevalent emotion to be anger (*M* = 6.47, SD = 2.06) than contentment (*M* = 8.96, *SD* = .84), *t*(9) = -3.34, *p* = .009. Moreover, participants' perceptions of team performance were significantly lower on days when a team member reported their most prevalent emotion to be anger (*M* = 6.67, *SD* = 1.40) than contentment (*M* = 8.45, *SD* = .93), *t*(9) = -3.85, *p* = .004. One participant outlined the impact of poor team dynamics on his feelings following the expedition, "I had a fantastic experience, but for me it felt like there was a lot of politics on the expedition and that's not what it's about. It has left a bit of a sour taste actually".

Daily diary ratings indicated that participants generally viewed their emotion regulation strategy selection to have a high impact on their own performance (*M* = 7.36, *SD* = 1.59). Indeed, daily perceptions of emotion regulation effectiveness were correlated with ratings of own (*r* = .56, p = <. 01) and team performance (*r* = .54, p = < .01), and task (*r* = .62, p = < .01) and social (*r* = .39, p = < .01) cohesion. Significant relationships were also observed between daily ratings of mental fatigue and the use of acceptance (*r* = .36, *p* = < .001), expressive suppression (*r* = .31, *p* = .02), self blame (*r* = .30, *p* = .03) and positive reappraisal (*r* = -.48, *p* = < .001) and reappraisal (*r* = -.41, *p* = < .01). No relationships were observed between the remaining emotion regulation strategies and mental or physical fatigue. Given the significant relationships between emotion regulation strategies and mental fatigue, we conducted ad hoc analyses to examine whether perceived emotion regulation

effectiveness mediated the relationship between emotional experience and mental fatigue. We hypothesised that daily ratings of anxiety would be related to mental fatigue and that this would be mediated by perceived emotion regulation effectiveness. We conducted bootstrapping analysis to examine the indirect effect of anxiety attitude alignment on mental fatigue via emotion regulation effectiveness using PROCESS (Hayes, 2013), which uses a regression-based path-analytical approach to testing mediation. The model, conducted with 5,000 bootstraps yielded a bootstrap mean estimate of the indirect effect of -.156. Confidence intervals that do not include zero indicate a significant indirect effect (mediation). As the confidence intervals observed ranged from -.206 to -.108 we concluded that emotion regulation effectiveness mediated the relationship between anxiety and mental fatigue. The mediation results are presented in Table 2. Post-expedition interviews supported these mediation findings, with the following quotation illustrating one participant's view of the impact of his emotion regulation on his performance:

> I was in conflict with people and it did detract from my ability to focus on other things because I was worrying about conflict with one individual and going through it in my mind again and again… that did absorb a disproportionate amount of time and what I found was that when life-threatening tasks were present, all of that [preferred/anticipated regulation] disappeared.

Interestingly, although participants reported higher daily ratings of mental (M = 7.56, SD = 1.08) than physical (M = 4.77, SD = 1.10), $t(10) = 4.86$, $p = < .001$, fatigue during the expedition, one participant perceived both a physical and emotional cost of reduced emotion regulation effectiveness:

> I saw myself snap. I felt more physically tired on days when I used a lot of nervous energy, without necessarily using physical energy; days when I was more nervous I was more tired and as a result snappier. If I was chipper and had a good night's sleep the conflict wouldn't have happened at all. I've never really experienced that before.

Another participant highlighted the impact of fatigue on interpersonal relationships:

> I saw others let themselves down by losing their self-control, particularly when they were mentally and physically tired; something really small can set you off on the ice… and that then impacts morale and performance.

In contrast to this negative impact, several participants perceived what one member termed "positive spirals" regarding the relationship between emotions, regulation and performance:

> The positive spiral my team went through with what we achieved and the enjoyment we were getting from it made us more enthusiastic, satisfied and drove us harder…we began to better read and understand each other. I suppose we recognized each others' 'things'; when somebody was being quiet, if they wanted to spend a bit of time alone, to read a book or listen to music. I became aware of my 'things' - those that teammates found frustrating - and tried to avoid those behaviors.

In line with the previous quotation, when providing advice for future expeditions several participants highlighted the importance of self awareness in driving emotion regulation, behavior and optimizing team dynamics:

> [teammate] wasn't very self-aware and he didn't understand how he impacted upon the team. Didn't seem to be able to take himself out of himself… Firstly you need to be self-aware, but then you need to have the tools to be able to act on it. If you're not aware that your behavior is upsetting people, you can't even start the process.

Several participants stated seizing any opportunity to remove oneself from the team to "clear the head", with one participant stating, "eventually in base camp you had the ability to wander off for 10-20 minutes; I sat down a couple of times on the beach and had a bit of a think about things". However, due to the difficulties associated with gaining physical space in this environment, the participants highlighted the importance of "psychological space":

> You need to be honest with everybody; you have to take time to yourself to put your music on because it's the only way you get your own space. Even in our private lives

there's never a time when you're in that sort of intense environment for that period of time. Sometimes you just have to get away from it. Everybody needs time out.

Many of the participants reported that reading, listening to music, and the use of banter and humor assisted with emotion regulation. On participant referred to several of these:

> Throw in a bit of banter, trying to interact and keep everybody happy... wait until it is private and then talk about it or whatever rather than an open forum. I think open and honest is good but there's a time and a place.

Several other participants also indicated the effectiveness of planning emotion expression:

> I would definitely deal with the mental pressures of it in much the same way as I did. With difficult situations, repress any desire to get angry about them at the time, give myself time to think about them, but ultimately once I had made proper decision about it, I would express it.

Discussion

This study used a mixed-method approach to examine the type, frequency and intensity of emotions experienced by an expedition team in the Antarctic, the strategies individuals employed to manage these emotions, and their perceived effectiveness and impact on group dynamics. We will discuss the findings relating to these aims in turn.

Emotional Experience in Antarctic Teams

The findings indicate a generally positive emotional experience, with happiness reflecting 41% of all emotions reported. This positive experience was perhaps not surprising given the voluntary nature of and commitment required to be selected and prepare for the expedition. Historically, much of the psychosocial research on polar expeditions has focused on the negative effects of adapting to extreme environmental circumstances and largely ignored the positive (Suedfeld & Weiss, 2000). However, the findings here indicate a complex emotional experience during such expeditions, where positive emotions were more frequently reported, but where a diverse range of negative emotions appeared to have a

greater impact on group dynamics and performance. The findings mirror those of Wood Hysong et al. (2000) who found participants on an Antarctic expedition to encounter a greater range of negative emotions, but to report these much more infrequently than positive emotion events. Such findings support recent calls for researchers to acknowledge positive affective responses to polar environments (see Palinkas & Suedfeld, 2008). The value of such findings lies in their contribution to a more accurate understanding of the emotional experience of individuals operating in isolated and extreme environments and the appropriate application of science to planning and supporting such endeavors.

As alluded to above, despite the high frequency of positive emotions experienced by participants, isolated incidents of conflict and ineffective emotion regulation (e.g., failure to suppress emotions) soured the overall expedition experience for several members of the team. The significant difference in task and social cohesion on days when team members reported anger versus contentment as their predominant emotion indicates a shared emotional experience and affective linkages between participants. Indeed, an important contribution of this study is the use of a longitudinal design to illuminate the positive and negative impact of affective linkages on team dynamics. These findings extend previous research that has highlighted the importance of emotional contagion in performance teams (see Barsade, 2002; Totterdell, 2000; Wagstaff et al., 2012a; 2012b) by sampling a group operating in an isolated, natural laboratory over time. Such findings have implications for teams who are required to live and work in close proximity for an extended period of time, with limited social and physical space (e.g., aviation, space and military personnel, sport performers, offshore workers). Moreover, the findings presented here suggest that the influence of such demands on emotions, behavior, performance, and group dynamics appear to build up over time. Indeed, in light of these findings, examining the relative contribution of emotional contagion to team dynamics and performance might be a fruitful area for future research.

Emotion Regulation, Effectiveness and Impact

The finding that participants often used emotion regulation strategies to change cognitions about or manage the expression of negative emotions is in line with extant literature (see Gross, 2002). Similarly, that participants perceived catastrophizing and ruminating to be the least effective strategies they employed echoes extant findings (Garnefski & Kraaj, 2006). Somewhat unexpectedly, diaries revealed two maladaptive strategies (acceptance and expressive suppression) to be the most effective. It was also surprising to observe no difference in the frequency of use or perceived effectiveness of adaptive (e.g., perspective taking) and maladaptive (e.g., expressive suppression) strategies. Qualitative interview findings supported these diary data, with participants indicating that they regularly perceived the need for, and effectiveness of, suppressing or accepting their emotions for the better of team dynamics, often at a perceived personal cost. Hence, the findings challenge the notion presented by Gross's (1998a) process model that emotion regulation through cognitive change strategies and those considered adaptive are inherently more effective than response modulation or maladaptive strategies. The findings support recent suggestions that Gross's process model might underestimate the complexity of emotion regulation strategies (Koole et al., 2011), particularly in demanding, extreme or isolated environments, where there are few opportunities for "time out" or time alone. That is, we might predict that the use of adaptive emotion regulation strategies might be easier to implement in non-performance domains and under more benign environmental conditions.

Given the findings regarding the frequency and perceived effectiveness of regulation strategies used, it is argued here that the expedition environment influenced participants' perceptions of emotion regulation requirements and strategy effectiveness. These views were at odds with pre-expedition interview expectations and were influenced by group dynamics (i.e., emotion display rules and norms). Interestingly, participants reported a limited capacity to engage in expressive suppression, which led to instances of conflict, as the expedition progressed. When considered with the higher mental than physical fatigue reported

throughout the expedition, and mediating role of emotion regulation effectiveness for participants' daily ratings of anxiety, the findings indicate salience of effective regulation strategies during such expeditions. These results provide support for extant small group research, which has associated the chronic use of emotional labor with decrements in health and performance (see, for reviews, Grandey, Diefendorff, & Rupp, 2013; Hülsheger & Schewe, 2011) and the propensity for individuals to lose his/her inclination and ability to perform such work (e.g., Payne, Jick & Burke, 1982). The data might also be explained by self-regulation theory (see Muraven & Baumeister, 2000). Given these findings, it is important to consider the cognitive mechanisms that underpin why individuals manage their emotion-related cognitions (e.g., acceptance) and expression (e.g., suppression) in such a self-defeating manner. The participants in the present study engaged in such strategies for long periods of time, maintaining a perception of their effectiveness, despite the increased mental fatigue associated with such acts. In attempting to explain participants' persistence with such maladaptive strategies, we might look to the strong relationship found here between ratings of emotion regulation effectiveness and task and social cohesion. To elaborate, the participants may have given precedence to emotion regulation for social purposes over personal desires. As one participant stated, "whatever needs to be done to ensure we are 'happy families'". Thus, caution is required when providing advice for isolated or extreme performance teams regarding the suppression of emotion, due to the potential mental fatigue associated with such acts here.

A limitation of the present study relates to the sampling of military personnel. Military training is designed to convert the civilian into a warrior and obedient killer who can perform acts defined by civilians as inappropriate and even abhorrent (Bryant, 1979). Such training may spuriously skew the parameters of "normal" emotional experience or regulation strategy selection and effectiveness. Given that many of the participants had served operational tours within the theatre of war, it is possible that their professional experiences

and training regarding the regulation of emotion, especially concerning the suppression of emotion, might have moderated the outcomes observed here regarding emotion regulation, performance and team dynamics. Moreover, the rank structure of the military might have influenced the extent of emotional labor reported by the participants, with team members possibly perceiving a greater need for emotional labor than would those on a non-military expedition. Given the potential influence of such sampling on the findings, future research might seek to replicate findings in samples of other high performing teams (e.g., sport teams at major championships, surgery teams, flight crews, emergency services). A further limitation relates to the use of single item measures of many variables. However, such methods were unavoidable given the logistics of field-based data collection and conversely, we feel that the repeated measures nature of the data and longitudinal design were a particular strength given the dearth of such designs in emotion research.

In sum, this study portrays a complex picture of the emotion process in isolated, performance teams. The findings also provide support for the importance of emotional labor and contagion in performance teams working in isolated or adverse environments. It would appear that the social and environmental conditions are likely to influence perceptions of emotion regulation requirements and effectiveness. Future research should seek to better understand why maladaptive and emotional suppression strategies were most frequently used and perceived to be most effective by individuals in this domain, despite an associated cognitive cost and further examine the specific contribution of emotional contagion to team dynamics and performance. Further, researchers should examine the adaptive and maladaptive behaviors specific to teams operating in extreme and isolated performance domains. Such information might assist the screening, selection, training and support of teams in such environments whilst also advancing fundamental emotion theory and research.

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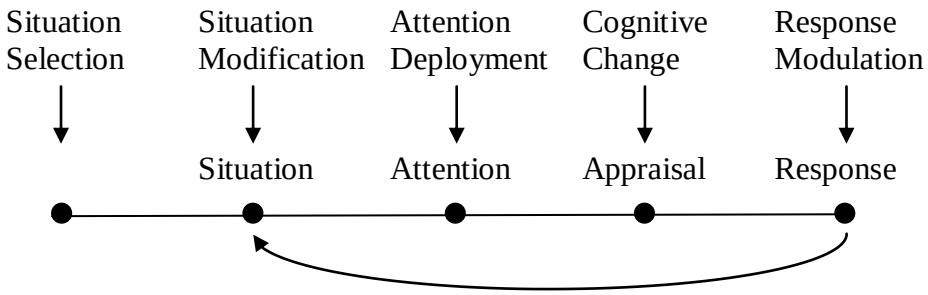
Situation Selection
Situation Modification
Attention Deployment
Cognitive Change
Response Modulation
Situation
Attention
Appraisal
Response

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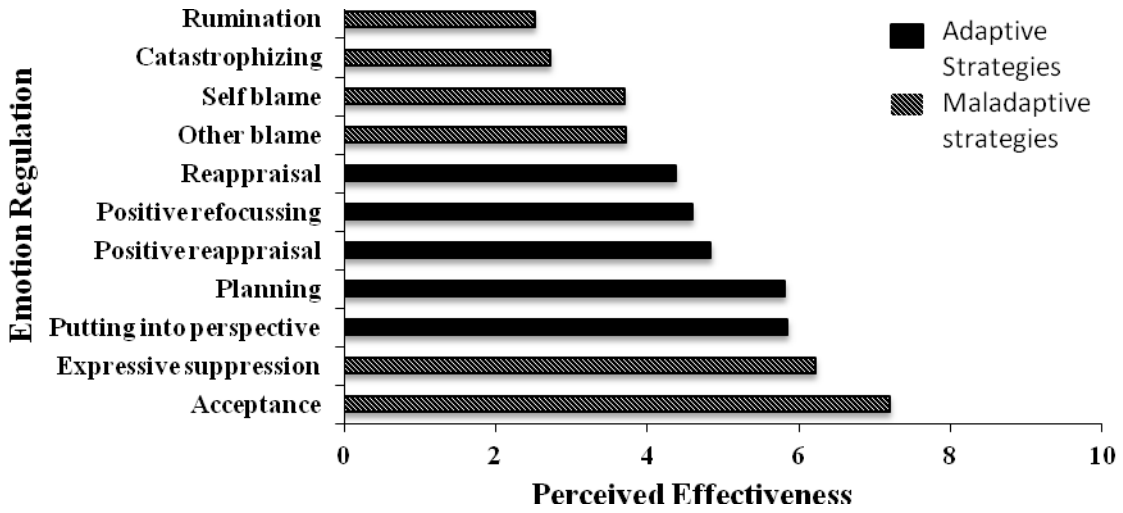
Rumination
Catastrophizing
Self blame
Other blame
Reappraisal
Positive refocussing
Positive reappraisal
Planning
Putting into perspective
Expressive suppression
Acceptance
Emotion Regulation
0
2
4
6
8
10
Perceived Effectiveness
Adaptive Strategies
Maladaptive strategies

2

3

Emotion	Frequency	Percent of Total
Happiness	170	41.06
Anxiety	32	7.73
Contentment	24	5.80
Boredom	22	5.31
Anger	21	5.07
Relief	20	4.83
Pride	18	4.35
Fear	18	4.35
Sadness	15	3.6
Hurt	11	2.7
Fatigue	10	2.4
Envy	8	2.0
Frustration	7	1.7
Loneliness	6	1.4
Shame	6	1.4
Disgust	6	1.4
Disappointment	5	1.2
Worry	3	.7
Guilt	3	.7
Excitement	3	.7
Irritation	3	.7
Love	2	.5
Uneasiness	2	.5
Elation	1	.2
Discomfort	1	.2
Total	**414**	**100.0**

1

2

	β	*SE*	3	
IV (Anxiety) to MV (Emotion regulation effectiveness)	.274***	.037		
MV(Emotion regulation effectiveness) to DV (Mental Fatigue)	-.567***	.042		
Direct effect of IV on DV	.397***	.034		
Standardised bootstrapped indirect effect estimates and bias corrected and accelerated			CI 95%	
	Effect	*SE*	*LLCI*	*ULCI*
Total indirect effect	-.156[a]	.025	-.206	-.108[b]

Note: *$p < .05$, **$p < .01$, ***$p < .001$.
LL=lower limit; CI=confidence interval; UL=upper limit.
[a] Indirect effects are significantly different at $p < .05$.
[b] 95% confidence interval does not encompass zero.