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Impact of Extreme Weather Conditions on High-Altitude Climbers' Goals and Quality of Experience

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Abstract

Goal setting and quality of experience play a key role in sustaining motivation during climbing expeditions. This study investigated these dimensions during a Himalayan expedition affected by prolonged weather emergency preventing climbers from reaching the peak. For one month, six climbers were monitored through experience sampling method (ESM), providing real-time information on their activities, goals and associated experience. Results showed that both quality of experience and goals varied significantly according to weather conditions. Goals were broadly focused on mountaineering, allowing climbers to retrieve opportunities for action even after failure to reach the peak. Optimal experience or flow was prominently reported before and after weather emergency, whereas apathy prevailed during it. Implications for promoting enjoyment and safety in recreational climbing are discussed.

KEYWORDS: Climbing; goal setting; daily experience; atmospheric conditions

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Introduction

Rock climbing is a sport activity that contains structural components of real or perceived danger, usually involving a natural environment in which the outcome is uncertain, but influenced by the participants (Ewert & Hollenhorst, 1997). Considering the potential high personal risks in performing this sport, much research has focused on the motivation underlying such practice. Many studies have taken into consideration personality characteristics. They have shown that climbers are characterized by high sensation seeking, conformity to social norms, search for thrill and experience by socialized means, boredom susceptibility, extraversion, and psychoticism (toughmindedness) (Aşçi, Demirhan, & Dinç, 2007; Breivik, 1996; Egan & Stelmack, 2003).

Beside stable psychological traits, research has taken into consideration context-contingent motivations related to the fulfillment of individuals' goals and to perceived quality of experience (Ewert, 1993; Manfredo, Driver, & Tarrant, 1996; Sarrazin, Roberts, Cury, Biddle, & Famose, 2002). Concerning goals, recreation activities can be instrumental to attaining certain psychological and physical goals that bolster a sense of competence and mastery, and ultimately sustain effort in climbing. Concerning quality of experience associated with climbing, studies have highlighted its role in promoting enjoyment and long-term leisure participation (Canham & Wiley, 2003; Csikszentmihalyi, 1975; Delle Fave, Bassi & Massimini, 2003; Ewert, 1994). In particular, attention has been devoted to flow or optimal experience, a positive and complex state of consciousness characterized by deep concentration, perception of clear goals, and high environmental challenges matched by adequate individual skills (Csikszentmihalyi, 1975). Such experience has been shown to have a powerful motivational effect in sport activities, and a strong relation to athletes' performance (Jackson & Csikszentmihalyi, 1999).

Expanding on current findings related to context-contingent motivations, in the present study we performed a joint analysis of perceived goals and quality of experience during high-altitude rock climbing. In particular, we addressed one of its crucial aspects: uncertain expedition outcome due to extreme and critical weather conditions (Ewert & Hollenhorst, 1994). We investigated how a prolonged weather emergency impacted on climbers' goal setting and overall quality of experience, and specifically on the opportunities for optimal experience. No such information had been gathered before; our study was thus a unique attempt to shed light on this topic. We collected data from an expedition team in the Indian Himalaya that was heavily struck by monsoons, and consequently ran life-threatening dangers and failed to reach the peak. Beside providing novel information on real-time experience during an expedition under harsh weather conditions, findings can have practical implications for the promotion of enjoyment and safety in recreational climbing, taking into consideration personal skills and environmental challenges.

Goals Research

Goals have been widely investigated in the sport literature as they are useful in explaining the ways in which individuals think about and respond to challenges (Heyman & Dweck, 1992). A clear goal allows an athlete to organize his

or her behavior in a structured way, to focus attention on specific objectives and cues, and to know what kind of action is required to meet the goal. Jackson & Csikszentmihalyi (1999) maintain that goals are the building blocks of motivation, and learning to set the right goal helps in maintaining the athlete's intent and effort at appropriate levels.

According to achievement goal theory (Dweck, 1999; Nicholls, 1984), individuals' goal is to demonstrate competence in achievement contexts. At least two goals are operating in these situations: (1) "task involvement" goals referring to task mastery, problem solving, experiencing personal improvement (in this case, competence is self-referenced); and (2) "ego involvement" goals aiming at demonstrating one's high ability and avoiding low performance in comparison with others' (competence is evaluated according to external criteria) (Adie, Duda, & Ntoumanis, 2008; Nicholls, 1984). In a study on boys attending climbing courses, Sarrazin et al. (2002) showed that task-involved participants exerted more effort and performed better than ego-involved ones. Most sport research on achievement goals, however, has been carried out in experimental settings and under controlled conditions. Such research has thus not accounted for the complexity of recreational contexts. From this perspective, studies in leisure research have shown that participation in recreational activities can be instrumental to attaining desired goal states such achievement/stimulation (reinforcing self-image, social recognition, skill development), autonomy/leadership (independence, control), risk taking, meeting new people or people with similar interests, learning (exploration, geography study), enjoyment of nature, introspection, creativity, and escape from personal, social and physical pressures (Manfredo et al., 1996). In particular, Ewert (1993) has shown that trip outcome, specifically failure to reach the top, can have a relevant impact on a posteriori evaluation of motivations to climb. Following Festinger's theory of cognitive dissonance (1957) and expectancy theory (Stewart & Carpenter, 1989), Ewert showed that motivations to climb were adjusted to the expedition outcome. Successful climbers attached great importance to individual motives such as accomplishment, using physical skills, showing others, competition, and personal testing. Unsuccessful climbers reported photography, experiencing the wilderness, and viewing the scenery as the prominent motives.

Goal setting was also investigated in relation to the mental strategies used by elite climbers to overcome obstacles while ascending and descending the mountain (Burke & Orlick, 2003), and to climbing disasters (Kayes, 2004). A distinction between long-term and short-term goals is drawn (Burton, 1993). On the one hand, short-term goals can be highly effective in that they provide frequent evaluations of success. On the other hand, long-term objectives can allow for short-term flexibility and prevent discouragement, if individuals should fail to meet daily performance standards (Kirschenbaum, 1985). Setting short-term goals, relative to learning rather than performance, can have a useful influence in meeting climbing-related difficulties. In addition, the most positive effects of goal setting are obtained when goals are broadly defined - rather than narrowly defined - in that they provide a wider view of the problem to be faced, and thus favor its solution as well as climbers' safety on the mountain, as shown in the analysis of a climbing disaster (Kayes, 2004).

Quality of Experience

Various studies have shown that the perceived quality of daily experience is related to the subjective evaluation of the environmental opportunities for action (challenges) and the personal capabilities (skills) in facing them (Csikszentmihalyi, 1975; Csikszentmihalyi & Csikszentmihalyi, 1988; Massimini & Delle Fave, 2000). The experience fluctuation model was built accordingly (Carli, 1986; Massimini, Csikszentmihalyi, & Carli, 1987), identifying four experiential profiles in association with a more or less balanced ratio between perceived challenges and skills: optimal experience, relaxation, apathy, and anxiety (Figure 1).

When individuals perceive both high challenges and high skills in a given activity (Massimini et al., 1987), optimal experience or flow is likely to arise. *Optimal experience* is a state of high concentration, involvement, control of the situation, clear goals and feedback, satisfaction and intrinsic reward (Csikszentmihalyi, 1975; Csikszentmihalyi & Csikszentmihalyi, 1988). Because it is an extremely gratifying experience, associated activities tend to be preferentially selected and replicated over time. This process has been termed psychological selection (Csikszentmihalyi & Massimini, 1985; Massimini & Delle Fave, 2000). It plays a crucial role in individual growth, as it directs a person's life theme, namely the activities, interests, and goals preferentially cultivated in life (Csikszentmihalyi & Beattie, 1979). *Relaxation* is associated with the perception of low challenges and high skills (Delle Fave, 1996). It is commonly characterized by positive mood and high intrinsic motivation, as well as low cognitive investment. Relaxation is primarily connected with energy restoration and low-challenging tasks, such as maintenance activities and TV watching (Delle Fave & Bassi, 2000). The experience of *apathy* is associated with low values of challenges and skills (Delle Fave & Massimini, 2005). It is characterized by psychic disorganization, with low values of the cognitive, emotional and motivational components of experience. High percentages of apathy in one's daily life can lead to potentially pathologic outcomes: As shown in clinical studies, the predominance of apathy hampers mental health and personal growth (Delle Fave & Massimini, 1992; Larson, 2000). Finally, *anxiety* is associated with high challenges and low personal skills. In this condition individuals do not feel able to cope with the situation, and they report high cognitive investment, negative affect, and often low intrinsic motivation. When the discrepancy between perceived high challenges and low skills is not too wide, anxiety can represent a stimulating experience for the individual. On the contrary, when the gap widens, the state of consciousness tends to disorganization, and a reduction in engagement and concentration levels is detected (Delle Fave, 1996; Delle Fave & Bassi, 2000).

A great number of studies in sport psychology has confirmed, for both elite and amateur athletes, the association of optimal experience with sports such as basketball, golf, figure skating, rock dancing, tennis (Csikszentmihalyi, 1975; Jackson, 1992; Jackson & Csikszentmihalyi, 1999; Muzio, 2004; Stein, Kimiecik, Daniels, & Jackson, 1995), and with recreational activities (Decloe, Kaczynski, & Havitz, 2009). Concerning climbing, previous studies have shown its preferential association with optimal experience: Climbers report to be intrinsically motivated, to perceive high challenges and cultivate the activity because of the positive,

complex experience attached to it (Canham & Wiley, 2003; Csikszentmihalyi, 1975; Delle Fave et al., 2003).

Researchers have also focused their attention on the links between optimal experience, goals and achievement motivation. Optimal experience is mostly reported within activities that are goal-directed and bounded by rules (Csikszentmihalyi, 1990). Moreover, optimal experience is associated with task involvement, mastery-oriented focus, high perceived ability, and eventually high performance (Csikszentmihalyi, 1990; Jackson & Csikszentmihalyi, 1999; Jackson & Roberts, 1992). Instead, over-concern with the outcome reflects a competitive orientation and is associated with athletes' worst performances. Csikszentmihalyi (1990) maintained that "the challenges of competition can be stimulating and enjoyable. But when beating the opponent takes precedence in the mind over performing as well as possible, enjoyment tends to disappear. Competition is enjoyable only when it is a means to perfect one's skills; when it becomes an end in itself, it ceases to be fun" (p.50).

Research on apathy and relaxation has shown that these experiences characterize passive leisure (Delle Fave & Bassi, 2003), but they can also be associated with both competitive and recreational sport activities (Stein et al., 1995). Apathy and relaxation have a negative impact on individuals' focus of attention, and favor distraction. These experiences also seem to occur more commonly when participating in recreational physical activities with co-participants than alone (Decloe et al., 2009). During mountaineering expeditions, a rather large portion of climbers' time is associated with relaxation and apathy (Delle Fave et al., 2003). This is due to the relatively long periods of inactivity at base or advanced camps, as usually happens in expeditions. Concerning anxiety, a great number of studies have shown that it has a negative impact on athletes' performance and well-being (for a review: Gallucci, 2008). In rock climbing literature, anxiety proved to be function of climbers' technical skills and experience, with more skilled climbers being able to regulate hazardous outcomes (Jakus & Shaw, 1996). Anxiety control is functional to climbers' survival (Benzi & Tamorri, 1988): If a climber is not able to master anxiety, he/she can lose control of the situation, get injured, or be unable to fully exploit his/her physical potential.

The Current Study

In light of the reported literature, the present study analyzed the goals and quality of experience of climbers who took part in an expedition to the Indian Himalayan region. The expedition team was unexpectedly struck by a weather emergency caused by late monsoons. For eight days, the climbers were exposed to heavy snowing and strong winds that destroyed their tents and increased the chances of running life-threatening risks, such as falling into a crevice. Due to these conditions, climbers failed to reach the peak.

In this study we specifically aimed at investigating how severe weather conditions impacted on climbers' goal setting and overall quality of experience, and in particular on the opportunities for optimal experience. Past research has primarily relied on interview techniques, and single-administration questionnaires (Csikszentmihalyi, 1975; Ewert, 1993; Jackson, 1992; Sarrazin et al., 2002). Instead, in

our investigation, we applied the experience sampling method (ESM; Csikszentmihalyi, Larson, & Prescott, 1977), a procedure that provides repeated real-time sampling of participants' time budget and associated experience, as events and situations unfold during real life.

We first identified three time periods: before, during and after weather emergency. We then performed descriptive and comparative analyses of climbers' activities, perceived goals and quality of experience in the three conditions. Concerning goals, we expected to detect both quantitative and qualitative differences, in terms of goal frequency and type. At the quantitative level, we hypothesized that climbers would report the highest number of overall expedition-related goals at the beginning of the expedition, and that this number would decrease during and after the emergency, as chances of reaching the summit dwindled. At the qualitative level, we hypothesized based on Ewert's results (1993) that goal content would change due to failure to reach the peak, shifting from climbing and ascending the mountain to interaction with the natural environment and leisure.

In line with our research aims, we also analyzed the quality of experience associated with different weather conditions. We first provided a descriptive analysis of the overall quality of experience reported in the three periods. We then analyzed the experience fluctuations based on the ratios between perceived challenges and skills in the different conditions and contexts (Carli, 1986; Massimini et al., 1987). We expected that the weather emergency would reduce climbers' opportunities for optimal experience, and increase occasions of apathy, relaxation, and anxiety. Apathy and relaxation would be related to the periods of inactivity induced by severe weather; anxiety would be due to the higher levels of environmental hazards, and thus physical risks, caused by the storms. Finally, we focused on the relationship between quality of experience and goals. As goals are an essential characteristic of optimal experience, we expected that participants would more frequently identify a goal in the situations when optimal experience was reported, irrespective of the weather conditions.

Method

Participants and the Expedition

Six Italian male climbers, mean age 29.3 years ($SD = 3.9$), voluntarily took part in the expedition to Thalay Sagar (6,904 m) in the Indian Himalaya. All participants came from Northern Italy. Four were skilled workers (carpenter, mason, blue collar, and photographer), one was a researcher at the Medical School in Milano, and one was a surgeon. Four were single and lived with their original family; one was married and had a child, and one lived with his partner. They were not professional climbers but all had great experience, in terms of years of practice, climbing frequency and locations (national and international sites and routes). All of them were members of CAI (Italian Alpine Club), a national association founded in 1863 with the aim of protecting the Italian alpine environment and fostering sport activities on the mountains. In addition to the six climbers, the expedition team included two doctors and three university researchers.

The expedition took place from the end of August until the beginning of October, and lasted 44 days: (a) five days were required to fly to and from India

and to carry out bureaucratic matters in New Delhi, which included obtaining a 30-day climbing permit from Indian authorities; (b) 13 days were spent traveling from New Delhi to the base camp in the Himalayan region and back; and (c) 26 days were devoted to mountaineering. For the purposes of this study, only the mountaineering period was analyzed.

During this period, climbers reached base camp, organized activities, and began to ascend and to settle advanced camps. In September, the weather in the Himalaya is normally nice with stable high pressure conditions: During the day, the sun shines and temperatures can reach 30 °C; during the night temperatures can go below zero. However, eight days (30.8% of the mountaineering time) were undermined by very bad weather. Heavy snow storms hit the area where the climbing team was staying, destroying their tents, and forcing them to descend from advanced camps to base camp. During descent, one climber fell into a crevice and was rescued - uninjured - by the other team members. Back at base camp, the participants were primarily confined to inactivity in their tents. After the weather emergency, reaching the peak was no longer possible: Participants climbed to advanced camps and bivouacs to get hold of the equipment they had left when the storm had arrived, and then prepared themselves to travel back to New Delhi.

Instrument and Procedure

Data were collected by means of experience sampling method (ESM) (Csikszentmihalyi et al., 1977), a well-established procedure that provides real-time repeated assessments of individuals' time budget and associated experience. Climbers were given an electronic pager—a wrist watch alarm—and a booklet containing standard ESM forms (Hektner, Schmidt & Csikszentmihalyi, 2007).

Pagers were programmed to send six random acoustic signals (beeps) a day during waking hours, in line with the literature on ESM validity and reliability (Hektner et al., 2007). The ESM form comprises (a) open-ended questions, investigating thoughts ("What were you thinking about?"), activities ("What was the main thing you were doing?"), location ("Where were you?"), social context ("Who were you with?"), and goals ("Was the activity you were doing important for some overall life goal? Which one/s?"); (b) 13-point Likert-type scales, ranging from 0 "not at all" to 12 "to the maximum", measuring the quality of experience in its affective, cognitive, and motivational components. Participants were asked: "Please, describe how you felt when you were beeped". A list of 22 adjectives - such as happy, alert, free, involved - followed. Two scaled questions further measured the level of perceived challenges and skills. In addition to these standard ESM questions, we added 3 more items measuring risk perception (in danger, in difficulty, afraid) for the purposes of this study.

A researcher informed climbers about the use of ESM in Italy. Participants were instructed on the use of alarms and forms. In particular, they were asked to fill in a form at signal receipt; when beeped while climbing, they were expected to reach a safe place before filling out questionnaires. During briefing, participants were also asked to bring forward suggestions which could improve ESM procedure at high altitudes. Based on suggestions, compared with the standard ESM sheet (Hektner et al., 2007), the format was reduced to 5.3 x 4 inches in size in order to

minimize weight. Debriefing took again place in Italy, after the expedition. Based on researchers' questions on the impact of ESM on their real-time experience, participants reported that ESM had a low level of intrusion on their tasks and experience during the expedition, confirming results from other studies (Hektner et al., 2007). This was further supported by their willingness to participate in a subsequent ESM session while climbing in Italian mountains.

Data Handling

During the mountaineering period, participants completed 780 questionnaires, 83.3% of the scheduled 936. Failure to answer the signal was the reason for the missing reports. In these cases, participants mainly reported not hearing the signal. As methodologically advised, answers given more than 15 minutes after signal receipt are normally discarded from data analysis, thus avoiding distortions associated with retrospective recall (Hektner et al., 2007). In ESM forms, it is possible to ascertain the time elapsed between signal receipt and the form filling-out because participants are asked to indicate the time when they were beeped, and the time when they started to fill out the sheet. The participants were not informed about the 15-minute time limit; in any case, they never surpassed it.

Self-reports were subsequently grouped into three time periods: before weather emergency (BWE; $N = 389$), during weather emergency (DWE; $N = 261$), and after weather emergency (AWE; $N = 130$). This distinction allowed us to analyze the effect of weather on the climbers' expedition activities, goals, and perceived quality of experience. Moreover, we were able to appraise the impact of the failure to reach the summit after weather emergency.

Given the large number of serial self-reports each participant filled out during the expedition, and the ensuing autocorrelations, we decided to adopt a subject-level data analysis (Larson & Delespaul, 1992) in which the participant is the unit of data aggregation. Such data aggregation squanders repeated measurements, increasing the probability of Type II errors. Moreover, considering the small number of participants, it limits the robustness of the statistical tests. However, this kind of analysis is conservative in that the assumption of independence is not violated, and it allows for pairwise comparisons between the different weather conditions. It was thus deemed necessary in this study.

In order to test our hypotheses, among ESM open-ended questions we focused on expedition activities and goals. At signal receipt, participants were asked to describe what they were doing and to report on a 0-12 scale whether the activity they were carrying out was important for some general life goal and, if so, for what goal. If they did not perceive any particular goal, they did not answer the open-ended question. Data were then coded using extant manuals (Hektner et al., 2007; Delle Fave et al., 2003). Two researchers assigned a numeric code to climbers' answers and grouped them into broad content categories according to functional criteria. Categories for the expedition activities were: camp activities, climbing, maintenance, leisure, interactions, and "miscellaneous" (including answers such as waiting, thinking in general, doing nothing). Goals were grouped into mountaineering, personal life, social relations, leisure, and maintenance. Interrater reliability was 91% for activities and 85% for goals. The frequencies of activities in

BWE, DWE, and AWE conditions were calculated as mean percentages of each participant's activity distribution. The same procedure was adopted in the analysis of participants' goals. Pairwise *t* tests were performed to compare mean percentages between the different weather conditions.

Concerning ESM scaled items, *z*-scores were obtained for each individual based on their global mean for each item. In line with previous studies (Csikszentmihalyi & Larson, 1984; Delle Fave & Bassi, 1998, 2000; Delle Fave et al., 2003), some ESM scaled variables were aggregated into general experiential dimensions: mood (happy, cheerful, sociable, friendly; Cronbach $\alpha = .79$, average $r = .48$), intrinsic motivation (free, relaxed, wish doing the activity, satisfied; Cronbach $\alpha = .73$, average $r = .40$), potency (alert, active, strong, concentrated; Cronbach $\alpha = .68$, average $r = .35$), engagement (involved, stake in the activity, goal; Cronbach $\alpha = .52$, average $r = .27$), confidence (control of the situation, sure, determined, clear ideas; Cronbach $\alpha = .70$, average $r = .37$), and risk assessment (in danger, in difficulty, afraid; Cronbach $\alpha = .58$, average $r = .32$). Alpha coefficients were deemed acceptable, even if the values for engagement and risk assessment were quite low. This is due to the small number of items within each experiential dimension[1]. In the present study, only the general experiential dimensions were analyzed. For each weather condition, aggregated experiential values (mean *z*-scores) were calculated on the number of participants (Larson & Delespaul, 1992). Pairwise *t* tests were performed to compare scores between the different weather conditions.

The Experience Fluctuation Model. The quality of experience was investigated through the experience fluctuation model (Carli, 1986; Massimini et al., 1987). In the model, the Cartesian plane was divided into eight sectors of 45°, called channels, each representing a specific ratio interval of skills on the x-axis, and challenges on the y-axis (Figure 1). Values of challenges and skills were standardized for each participant, and their mean value, as well as the mean of all participants' means, corresponded to the center of the model, called subjective mean.

As outlined in the introduction, each channel identifies a specific experiential profile (Csikszentmihalyi, 1990, 1997; Delle Fave & Bassi, 2000, 2003; Delle Fave & Massimini, 2005). In particular, channel 2, characterized by a balance of challenges and skills above subjective mean, is associated with optimal experience. Channel 4, in which skills are higher and challenges are lower than subjective mean, is associated with a state of relaxation. Channel 6, where both challenges and skills values fall below the mean, is associated with apathy. Channel 8, with challenges higher and skills lower than subjective mean, is characterized by anxiety. The remaining challenges/skills ratios are called transition channels (Csikszentmihalyi, 1997; Delle Fave, 1996) as they are associated with intermediate experiential states: arousal (channel 1), control (channel 3), boredom (channel 5), and worry (channel 7).

In this paper, data analysis and discussion will be centered on the four major channels. We calculated the mean percentage distribution of the self-reports in the channels in the different weather conditions, and compared scores using

[1]As suggested by Farner and Meloen alpha-30 estimate criterion (2000), if these experiential dimensions had the same average correlation r but 30 instead of 3 items, Cronbach α coefficients would amount to .92 for engagement and .93 for risk assessment, thus attesting to their potential strong reliability.

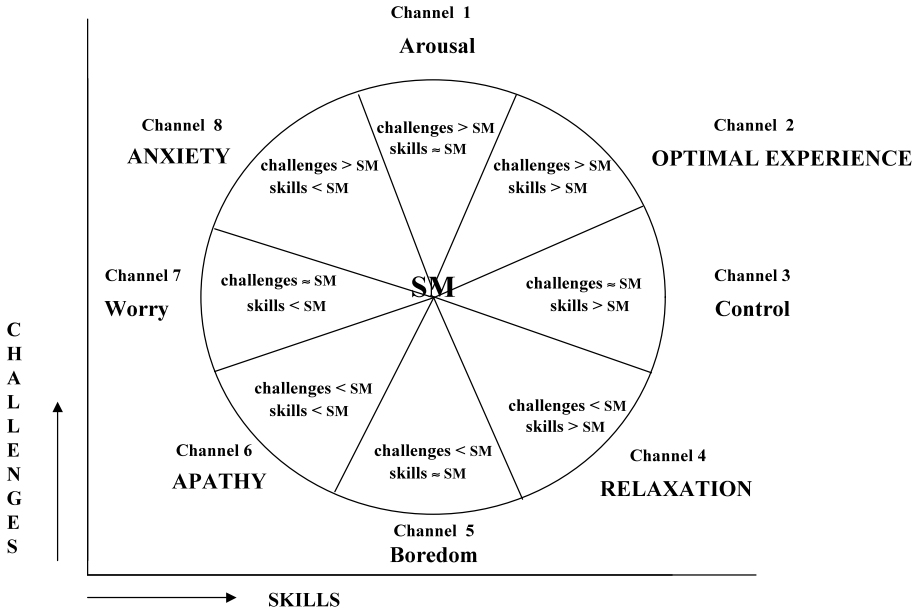

FIGURE 1: THE EXPERIENCE FLUCTUATION MODEL (SM = SUBJECTIVE MEAN).

pairwise *t* tests. Finally, we analyzed the percentages of ESM sheets in which a goal was described falling into the main channels before, during and after weather emergency.

Results

Expedition Activities

Table 1 shows the mean percentage distribution of the activity categories in the three conditions: BWE (before weather emergency), DWE (during weather emergency), and AWE (after weather emergency). Mean percentages were calculated on the basis of each climber's activity distribution in each condition.

Across the three weather conditions, categories included similar activities: "Camp activities" comprised walking, cooking, fixing the tent, and preparing the rucksack/material for climbing; "climbing" included answers such as ascending the mountain, fixing ropes and spits, exploring surroundings; "maintenance" included taking care of one's health, resting and eating; "leisure" regarded activities such as reading, playing cards, and listening to music; "interactions" referred to conversations among expedition members. The category "miscellaneous" primarily consisted in "doing nothing" (48.5%).

The mean percentage distributions of activity categories varied according to weather conditions. Camp and maintenance activities predominated in BWE (71.4%). Little time was devoted to leisure and interactions among team members. In DWE participants were forced to inactivity and stopped climbing. Maintenance was their most frequent activity category, followed by leisure, camp activities,

Table 1. Activity Mean Percentage Distribution.

Activities	BWE (6)[a]		DWE (6)[a]		AWE (6)[a]	
	M	*SD*	*M*	*SD*	*M*	*SD*
Camp activities	35.78	2.99	17.13	7.74	39.26	12.75
Climbing	4.48	3.17	–	–	4.14	8.33
Maintenance	35.63	4.93	37.51	2.83	36.33	6.20
Leisure	6.23	5.51	20.47	10.98	12.83	11.43
Interactions	10.88	6.06	12.36	7.15	4.97	6.35
Miscellaneous	7.00	4.76	12.53	6.56	2.47	2.87

Note. BWE = before weather emergency; DWE = during weather emergency; AWE = after weather emergency.

[a] = *N* participants.

Dashes indicate that no answers fell into the category "climbing" during weather emergency.

miscellaneous and interactions. Pairwise *t* tests between the BWE and DWE conditions showed that participants significantly reduced camp activities ($t(5)=6.6$, $p<.002$) and, at the same time, reported more leisure ($t(5)=3.1$, $p<.03$) and miscellaneous activities ($t(5)=6.6$, $p<.002$). In AWE camp activities resumed predominance, followed by maintenance, leisure, interactions, climbing, and miscellaneous. Pairwise *t* tests between DWE and AWE revealed a significant increase in camp activities ($t(5)=3.0$, $p<.04$) in AWE, as well as a significant decrease in interactions ($t(5)=4.6$, $p<.006$), and miscellaneous ($t(5)=5.0$, $p<.005$). In many respects, expedition activities in AWE were similar to those in BWE, with only a significant decrease of the category miscellaneous in AWE ($t(5)=5.1$, $p<.004$); also an apparent decrease in interactions and an increase in leisure were detected, but these differences were nearly significant ($t(5)=2.0$, $p<.09$ and $t(5)=2.3$, $p<.07$, respectively).

Goals During the Expedition

On average, climbers reported that they perceived goals in 67.7% of the self-reports in BWE (*SD* = 18.7), 20.2% in DWE (*SD* = 16.2) and 12.1% in AWE (*SD* = 10.2). An overall drop in goal setting was detected from BWE to AWE. In particular, the difference in goal percentage between the BWE and DWE conditions was significant ($t(5)=3.5$, $p<.02$), as well as the difference between BWE and AWE ($t(5)=5.4$, $p<.003$).

Table 2 shows that, during the whole period, the majority of goals were related to "mountaineering". This category comprised answers such as mountaineering in general (50.8%), the expedition (17.5%), the ascent (17.5%), adventure (4.8%), and reaching the top (4.2%). All the remaining goal categories were reported in smaller percentages. "Personal life" goals included learning and acquiring knowledge, and feeling mentally well; in "social relations" friendship, getting to know new people, and dialogue were the most reported goals; "leisure" referred to having fun and life within nature; "maintenance" included trying to survive, resting, and relaxing.

Table 2. Goal Mean Percentage Distribution.

Goals	BWE (6)[a]		DWE (5)[a]		AWE (5)[a]	
	M	*SD*	*M*	*SD*	*M*	*SD*
Mountaineering	68.83	30.65	38.81	48.56	35.94	48.57
Personal life	12.75	9.71	24.33	38.86	3.50	4.24
Social relations	2.58	3.44	3.28	6.67	1.67	4.08
Leisure	4.38	6.06	5.98	12.12	11.67	18.35
Maintenance	11.46	14.74	10.94	18.48	13.89	22.15

Note. BWE = before weather emergency; DWE = during weather emergency; AWE = after weather emergency.

[a] = *N* participants.

The mean percentage distributions of the goals in BWE and DWE were similar, with mountaineering being the most frequent goal category, followed by personal life, maintenance, leisure, and social relations. In AWE the most frequent goal category was again mountaineering, followed by maintenance, leisure, personal life, and social relations. Due to variability in goal frequencies among climbers (notably, high SD_s) few significant differences were detected. Personal life goals were more frequently reported in BWE than AWE ($t(4)=3.0$, $p<.03$). In addition, a nearly significant decrease in mountaineering goals was reported from BWE to AWE ($t(4)=2.2$, $p<.08$), and from DWE to AWE ($t(4)=2.1$, $p<.09$). In qualitative terms, in the AWE condition climbers no longer mentioned the expedition and reaching the top as goals. Moreover, concerning personal life goals, "learning and acquiring knowledge" was the most frequent goal in BWE, while "feeling mentally well" was predominant in DWE.

Quality of Experience During the Expedition

Table 3 illustrates the values (mean z-scores) of the aggregated experiential dimensions in the three weather conditions.

Within each condition *t* tests were performed in order to assess whether scores were significantly different from zero (i.e. the mean). The overall quality of experience in BWE was characterized by around average values of mood, intrinsic motivation, potency, risk assessment, confidence, challenges, and skills. In addition, a significant above average score of engagement was detected ($t(6)=3.3$, $p<.03$). In DWE most experiential dimensions were significantly below average: intrinsic motivation ($t(6)= 5.8$, $p <.002$), potency ($t(6)=2.8$, $p<.04$), engagement ($t(6)=2.7$, $p<.05$), confidence ($t(6)=2.9$, $p<.03$), challenges ($t(6)=3.6$, $p<.02$), and skills ($t(6)=5.6$, $p<.003$). In AWE the scores of potency ($t(6)=2.8$, $p<.04$), risk assessment ($t(6)=3.8$, $p<.02$), and challenges ($t(6)=6.4$, $p<.002$) were significantly above average.

Paired *t* tests highlighted significant differences in the experience between the BWE and DWE conditions: Scores of intrinsic motivation ($t(6)= 4.8$, $p<.005$), engagement ($t(6)=3.0$, $p<.03$), challenges ($t(6)= 2.9$, $p<.04$), and skills ($t(6)= 2.7$,

Table 3. Quality of Experience in the Weather Conditions.

	BWE (6)[a]		DWE (6)[a]		AWE (6)[a]	
	M	*SD*	*M*	*SD*	*M*	*SD*
Mood	-0.07	0.23	-0.29	0.33	0.03	0.37
Intrinsic motivation	0.09	0.16	-0.45**	0.19	-0.03	0.28
Potency	0.04	0.25	-0.24*	0.21	0.23*	0.20
Engagement	0.26*	0.20	-0.41*	0.38	0.12	0.28
Risk assessment	-0.11	0.21	0.19	0.21	0.49*	0.30
Confidence	0.05	0.35	-0.34*	0.28	0.04	0.17
Challenges	0.13	0.21	-0.38*	0.26	0.29**	0.11
Skills	0.09	0.34	-0.46**	0.20	0.15	0.27

Note. BWE = before weather emergency; DWE = during weather emergency; AWE = after weather emergency.

[a] = *N* participants.

* $p < .05$; ** $p < .003$.

$p<.04$) were significantly lower in DWE. Risk assessment was higher, and the difference was nearly significant ($t(6)= 2.2$, $p<.08$). The widest experiential dissimilarity was however observed between the DWE and AWE conditions, with significantly lower scores of intrinsic motivation ($t(6)= 2.8$, $p<.04$), potency ($t(6)=3.6$, $p<.02$), risk assessment ($t(6)= 2.7$, $p<.05$), confidence ($t(6)= 2.7$, $p<.05$), challenges ($t(6)= 5.1$, $p<.004$), and skills ($t(6)= 5.3$, $p<.003$) in DWE. Also the value of engagement was lower, and the difference was nearly significant ($t(6)= 2.2$, $p<.08$). The quality of experience in BWE and AWE was substantially similar, with only higher risk assessment in AWE ($t(6)= 3.3$, $p<.02$).

Self-report Distribution in the Channels

Table 4 shows the mean percentage distribution of the self-reports in the major channels of the experience fluctuation model.

In the BWE and AWE conditions, optimal experience (channel 2) prevailed, followed by relaxation (channel 4), apathy (channel 6), and anxiety (channel 8) in BWE, and by relaxation, anxiety, and apathy in AWE. In DWE apathy was most frequently perceived, followed by relaxation, anxiety and optimal experience. The mean percentage of optimal experience was significantly higher in BWE than in DWE ($t(5)=3.3$, $p<.02$) and AWE ($t(5)=3.0$, $p<.03$). On the contrary, the apathy mean percentage was significantly higher in DWE than in AWE ($t(5)=3.2$, $p<.03$); its percentage was also higher in BWE compared to DWE, but the difference was nearly significant ($t(5)=2.1$, $p<.09$).

Goal Percentage Distribution in the Channels

During the mountaineering period, 58.9% (N=202) of all the self-reports in which a goal was described fell into channels 2 (optimal experience), 4 (relaxation), 6 (apathy), and 8 (anxiety). In particular, the biggest share of this percent-

Table 4. Channel Mean Percentage Distribution.

Channels	BWE (6)[a]		DWE (6)[a]		AWE (6)[a]	
	M	*SD*	*M*	*SD*	*M*	*SD*
(2) Optimal Experience	24.74	19.43	7.14	8.51	26.81	20.14
(4) Relaxation	18.50	25.79	18.06	21.60	19.53	23.80
(6) Apathy	14.99	12.89	33.48	24.37	10.36	11.12
(8) Anxiety	6.63	10.20	9.89	7.21	12.08	11.10

Note. Mean percentages were calculated for all the eight channels in the model but only scores of major channels are reported. BWE = before weather emergency; DWE = during weather emergency; AWE = after weather emergency.

[a] = *N* participants

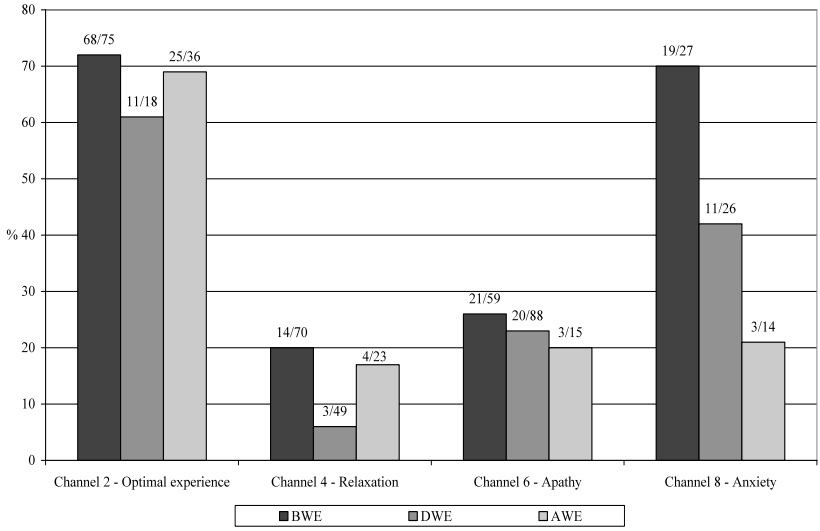

FIGURE 2. PERCENTAGES OF GOALS IN THE MAIN CHANNELS OF THE EXPERIENCE FLUCTUATION MODEL.

Note. Labels on the bars report the number of goals divided by the number of self-reports in each channel under each weather condition. BWE = before weather emergency; DWE = during weather emergency; AWE = after weather emergency.

age was associated with channel 2 (51.5%), compared with 21.8% in channel 6, 16.3% in channel 8, and 10.4% in channel 4.

Figure 2 shows the percentages of goals in the main channels for each weather condition. Percentages were calculated by dividing the number of reported goals by the number of self-reports falling into each channel under each condition.

In all four channels, the highest goal percentages were reported in BWE, especially in channels 2 and 8. In DWE, the percentages dropped for all channels, and in AWE they further dropped for channels 6 and 8. On the contrary, in channel 2 and to a small extent also in channel 4 the percentages increased. In addition, data showed that only in channel 2 did goal percentages represent a substantial share across the three weather conditions.

Since goals were mainly reported in channel 2, the percentage distribution of goal categories in the channels in the different conditions was not reported.

Discussion

Real-time repeated experience sampling allowed us to capture the dynamic aspects of the climbers' daily life on the mountain, and showed that activities, goals, as well as the associated experience substantially varied according to weather conditions.

Throughout the expedition, climbers had to carry out standard activities that were required to survive at high altitude, such as maintenance; all the other activities (related to camp organization, climbing, leisure time, interactions, and miscellaneous) were influenced by the weather. Also, associated goals varied in quantitative and qualitative terms. Quantitatively, as hypothesized, climbers more frequently reported expedition-related goals in BWE, with a significant reduction in goal frequency in DWE and AWE. Qualitatively, we expected a shift in goal content from climbing and ascending the mountain to interaction with the natural environment and leisure. Our hypothesis was partially substantiated by findings. Due to high variability in goal frequencies among climbers, few significant differences were detected. We observed that mountaineering-related goals prevailed throughout the expedition, with mountaineering in general as the most common answer. In BWE, and with a smaller percentage also in DWE, climbers also included the expedition, reaching the top, and ascent. In AWE, the answers reaching the top and expedition were not quoted anymore, and mountaineering in general became the predominant goal again. The overall small percentage of the achievement goal reaching the top can be related to the fact that the expedition itself was not a competition, and the climbers did not feel compelled to reach the summit, or to do better than other teams. Concerning the distinction between narrowly-defined and broadly-defined goals (Kayes, 2004), in this study mountaineering in general was set as a primary goal from the beginning, thus funneling climbers' efforts and energy into an objective that was not necessarily linked to success/failure evaluation, or to the compelling application of rigid formulas and solutions to existing problems. This further implied that climbers could set mountaineering as a goal also in AWE - when failure to reach the top was an established fact - without needing to cope with cognitive dissonance, as suggested by Ewert (1993), or shift from mountaineering and climbing goals to more general goals associated

with leisure, as initially hypothesized. In fact, a shift in content was observed in DWE, a time in which climbers tried to organize activities and focus attention on feasible objectives related to personal life, social relations, and leisure. The difference between our findings and Ewert's may be related to the sampling procedure, real-time versus a posteriori data gathering. Real-time sampling allowed us to track the dynamic pattern of goal setting and content according to weather conditions

Concerning the quality of experience associated with the mountaineering period, results showed that climbers reported similar experiences in BWE and AWE, characterized by around average mood, intrinsic motivation, confidence and skills. In BWE climbers also reported around average challenges and risk assessment, and above average engagement. In AWE the engagement score was around average, but potency, risk assessment, and challenges values were significantly higher than average. The good weather after the storm had caused snow to melt, making the retrieval of the climbing material and the descent risky and difficult. Coherently, climbers reported significantly higher levels of perceived risk in AWE. However, they reported a substantial significant improvement in the overall quality of experience compared with DWE. The worst experience was reported in DWE, with below average values of most experiential dimensions. This experience completely diverged from the ones reported both in BWE and AWE.

These results were in line with the distribution of the self-reports in the channels of the experience fluctuation model in the three weather conditions. Optimal experience prevailed in BWE and even in AWE, when there were no more chances of reaching the summit. As hypothesized, the frequency of optimal experience significantly declined in DWE. In the latter condition, apathy was predominant, and significantly higher than in BWE and AWE. Contrary to expectations, similar mean percentages of relaxation and anxiety were detected among the three conditions. Relaxation accounted for 20-40% of the overall climbers' experience. As shown in previous studies (Delle Fave et al., 2003), this may be related to the fact that a given share of relaxation is necessary to recover from daily exhaustion and replenish energy storage. By contrast, anxiety was reported in small percentages, ranging from 6.6% in BWE to 12.1% in AWE. Based on this finding, we can suggest that climbers in our study showed proficiency in tackling uncertain weather conditions, and proved able to regulate hazardous outcomes. As in previous studies, this may be related to the climbing skills and years of experience of this particular expedition team (Jakus & Shaw, 1996).

Finally, we focused on the relationship between quality of experience and goals, investigating the percentage distribution of goals in the main channels of the experience fluctuation model. As expected, the largest percentage of goals (more than half of the answers) was associated with optimal experience (channel 2). This finding confirmed theoretical assumptions on the preferential association of optimal experience with goal-directed activities (Csikszentmihalyi, 1990). The same result was obtained by calculating goal percentages on the number of self-reports in each channel under each condition. Goal setting varied according to both weather conditions and challenges perception. In channels 2 and 8 (optimal experience and anxiety, both characterized by above average challenges), climbers reported the highest percentages of goals, especially in BWE. By contrast, the

lowest percentages were related to channels 4 and 6 (relaxation and apathy, both with below average challenges). This can be linked to climbers' susceptibility to opportunities for action. As shown in previous studies, participants seemed to be susceptible to variations in challenges differently from other samples, for example students (Delle Fave et al., 2003). They described a globally negative experience, similar to boredom, in channel 4 (relaxation), and a globally engaging and positive experience in channel 8 (anxiety). Such experiential profiles are congruent with results from studies on climbers' personality, showing that climbers usually report high scores of boredom susceptibility and sensation seeking (Aşçi, Demirhan, & Dinç, 2007; Breivik, 1996; Egan & Stelmack, 2003). Bad weather, however, had a global impact on goal setting, reducing the frequency of goals reported in all of the main channels. As expected, the only channel in which the percentage of goals remained consistently high (above 60%) was the one associated with optimal experience. As previously reported (Delle Fave & Massimini, 2005; Jackson & Csikszentmihalyi, 1999), a goal not only helps a sportsman/woman to focus attention and to organize behavior and intentions in a structured way, it is also a key characteristic of optimal experience.

Strengths and Limitations

To the best of our knowledge, this study is the first one to provide real-time monitoring of climbers' goals and quality of experience during unpredictable extreme weather conditions. Analyses did not allow us to draw causal relations, but to depict the dynamic real-time relationships between weather conditions, goal perception and quality of experience. The major limitation was related to sample size. While the present team size was typical of high-altitude expeditions, it greatly reduced statistical power and the use of more elaborate statistical analyses. Future studies should try to increase sample size by pooling data together from several expedition teams.

In addition, goal setting in high-altitude rock climbing deserves further investigation. In this study, we asked climbers to freely report the goals they perceived during mountaineering. Moreover, the expedition was organized for recreational purposes, and no competition was involved. For these reasons, no questionnaire was used to distinguish between task versus ego involvement goals (Nicholls, 1984), and climbers' goals were classified on the basis of functional criteria. The prevailing goal contents suggested that climbers were task involved in that, for example, they were primarily concerned with mountaineering in general, rather than climbing success, and with acquiring knowledge (personal life), rather than performing better than other teams. More studies are needed to shed light on task and ego involvement in rock climbing and, more generally, in recreational sports in which life and survival are often at stake, rather than competition. In particular, promising results could stem from the analysis of optimal experience from the goal perspective (Jackson & Roberts, 1992). Goals related to outcome, reflecting a competitive orientation and ego involvement, could not only undermine the enjoyment associated with the expedition, in case of failure to reach the top. They could also lead climbers to run life-threatening risks, when the objective is reaching the peak at all costs, and to climbing disasters (Kayes, 2004), narrowing the

problem-solving process. On the contrary, goals related to task involvement and mastery could be associated with positive rewarding experiences and good performance in facing adversities.

Present findings did not only provide novel information on climbers' experience under extreme weather conditions. They also brought forward practical implications for promoting enjoyment and safety in recreational activities. First, climbers should be aware of the complexity of high-altitude expeditions, and should expect to face unpredictable weather and mountain conditions. Second, optimal experience proved to be a highly structured experience, associated with intrinsic reward and goal-directed action, sustaining climbers throughout the mountaineering period. Climbers should be trained to set affordable challenges vis a vis personal skills, in order to maintain the enjoyment in the activity and, at the same time, to secure personal safety. Our results thus suggest that a possible way to prevent disasters could be the promotion of management programs that seek to match participants' skills with appropriate activity settings. This task could be fulfilled by national bodies, such as CAI (Italian Alpine Club) in Italy, through on-site training courses or information dissemination. Finally, a way of helping climbers to avoid death perils could rely on climbers' ability to set appropriate goals, broad enough to allow for flexible problem solving in the face of unexpected difficulties, and mastery-focused in order to facilitate meaningful and rewarding experiences.

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