

## BRIEF REPORT

# Relations Between Self-Reported and Linguistic Monitoring Assessments of Affective Experience in an Extreme Environment

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**Introduction**—Approaches for monitoring psychosocial health in challenging environments are needed to maintain the performance and safety of personnel. The purpose of the present research was to examine the relationship between 2 candidate methods (self-reported and linguistics) for monitoring affective experience during extreme environment activities.

**Methods**—A single-subject repeated-measures design was used in the present work. The participant was a 46-year-old individual scheduled to complete a self-supported ski expedition across Arctic Greenland. The expedition lasted 28 days, and conditions included severe cold, low stimulation, whiteouts, limited habitability, and threats to life and limb. During the expedition, the participant completed a daily self-report log including assessment of psychological health (perceptions of control and affect) and a video diary (emotion). Video diary entries were subjected to linguistic inquiry and word count analyses before the links between self-report and linguistic data across the expedition period were tested.

**Results**—Similarities in the pattern of self-reported and linguistic assessments emerged across the expedition period. A number of predictable correlations were identified between self-reported and linguistic assessments of affective/emotional experience. Overall, there was better agreement between self-reports and linguistic analytics for indicators of negative affect/emotion.

**Conclusions**—Future research should build on this initial study to further test the links between self-reported affect and emotional states monitored via linguistics. This could help develop methods for monitoring psychological health in extreme environments and support organizational decision making.

*Keywords:* emotion, monitoring, self-reports, linguistic analysis, extreme environment

## Introduction

Many professions continue to require individuals to operate in extreme environmental conditions—for example, humanitarian and disaster relief workers, astronauts participating in long-duration space missions, those completing expeditions, and military and defense personnel operating in remote parts of the Earth. Organizations responsible for sending personnel into these isolated, remote, and potentially dangerous contexts have a duty of care to monitor health status and provide appropriate

levels of support. As such, a current focus of research in extreme environments is to develop valid and reliable methods for monitoring indicators of performance and health.<sup>1</sup> Currently efforts are focused on developing low-burden, passive approaches that can be used to monitor individuals and teams operating under stress. Such developments are important for ensuring the safety and fitness for duty of individuals and teams living and working in such contexts.

Although attempts have been made to advance automated monitoring technologies related to performance and fatigue,<sup>2</sup> there is relatively little published work on methods for monitoring psychological and mental health in extreme settings. One indicator of psychological health that has received a good deal of attention in extreme settings is affect. Affect is an overarching term used to describe a person's feelings, emotions, and

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mood. In the past, situational reports of affect during extreme environment expeditions have been captured in weekly<sup>3</sup> and daily self-reports.<sup>4</sup> Based on prior research, we would expect that chronic disruption to affect will have an effect on a person's health status and may eventually lead to clinical health issues. Although self-reported assessments of affect and emotional states have demonstrated validity in extreme settings, alternative methods, such as linguistic analyses based on video diaries, may offer a more acceptable and lower-burden alternative to completing repetitive surveys and daily diaries to monitor affective state.

Linguistic analysis is related to the structure of language and what we can learn from the words that people use. In previous studies, text transcribed from voice accounts have been used to examine thoughts, feelings, and indicators of personality and motivation.<sup>5</sup> The aim of the present report was to examine the extent to which daily self-reported affect during an extreme environment expedition was associated with emotion metrics resulting from linguistic analysis of video data. To demonstrate validity, we would expect to see moderate to strong correlations between self-reported and linguistic assessments of affect (or emotion). As an external validity check, perceptions of control were also assessed during the expedition. Perceived control is fundamental to effective coping and shows consistent associations with self-reported affect. Relations between perceived control and linguistic analyses of emotion that are consistent with those observed for affect would be anticipated.

## Method

### PARTICIPANT

The participant in this exploratory study was a 46-year-old man scheduled to complete a self-supported ski expedition across the Greenland ice cap. The participant had previously taken part in an expedition in the Arctic and was familiar with the demands of polar environments. It was anticipated that the expedition would last around 26 days (actually completed in 28 days), requiring the participant to ski over 580 km and endure challenging conditions, including severe cold, whiteouts, low stimulation, sleep disruption, and limited possibility for evacuation. The study received ethical approval from the University of Northampton in the United Kingdom, and signed informed consent was secured before the participant took part. Background information on the study aims was provided to the participant; however, he did not have intimate knowledge of the measures or analytical approaches used.

## MEASURES

### *Self-report*

During the expedition, the participant completed a daily diary log at the end of each day. The diary included a single item on *perceived control* and responses were provided based on a 5-point scale ranging from not at all (1) to very much so (5). To measure self-reported *affect*, the positive and negative affect schedule<sup>6</sup> was employed. The 20-item positive and negative affect schedule includes 10 items indicative of positive affect (interested, excited, and strong) and 10 for negative affect (distressed, upset, and hostile). A similar 5-point response scale was used, ranging from not at all/very slightly (1) to extremely (5).

### *Voice diary*

At the end of each expedition day, the participant recorded a video diary. The video diary was recorded in private within his own tent using diary-room procedures followed in previous work.<sup>7</sup> Typically, data capture included having the participant sit inside the tent and hold the camera in front of his face. When completing the video recording, the participant was asked to respond to 3 questions:

1. How do you feel?
2. What were the best parts of the day?
3. What were the worst parts of the day?

Video diaries ranged in length from approximately 30 s to 3 min. The material resulting from the video diaries was transcribed verbatim to conduct the linguistic analysis. Transcription resulted in 9 pages of text and 6391 words.

## DATA ANALYSIS

In total, 28 self-reported daily diary logs and 25 video diaries were completed during the expedition. The participant chose not to record a video diary on 3 days. Analytical approaches were consistent with single-subject-design research. Mean and standard deviation scores were computed for all of the study variables. Temporal changes in positive and negative affect were then mapped against expedition days. We analyzed 25 video diary accounts using the Linguistic Inquiry and Word Count (LIWC; Pennebaker Conglomerates Inc, Austin, TX) software. The 2015 version of LIWC was employed; the software counts and assimilates the instances of approximately 4500 words across multiple dimensions representing different psychological processes. Within the present report, we were interested in

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