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## Applying Positive Psychology in the Study of Extreme Environments

Peter Suedfeld

*University of British Columbia*

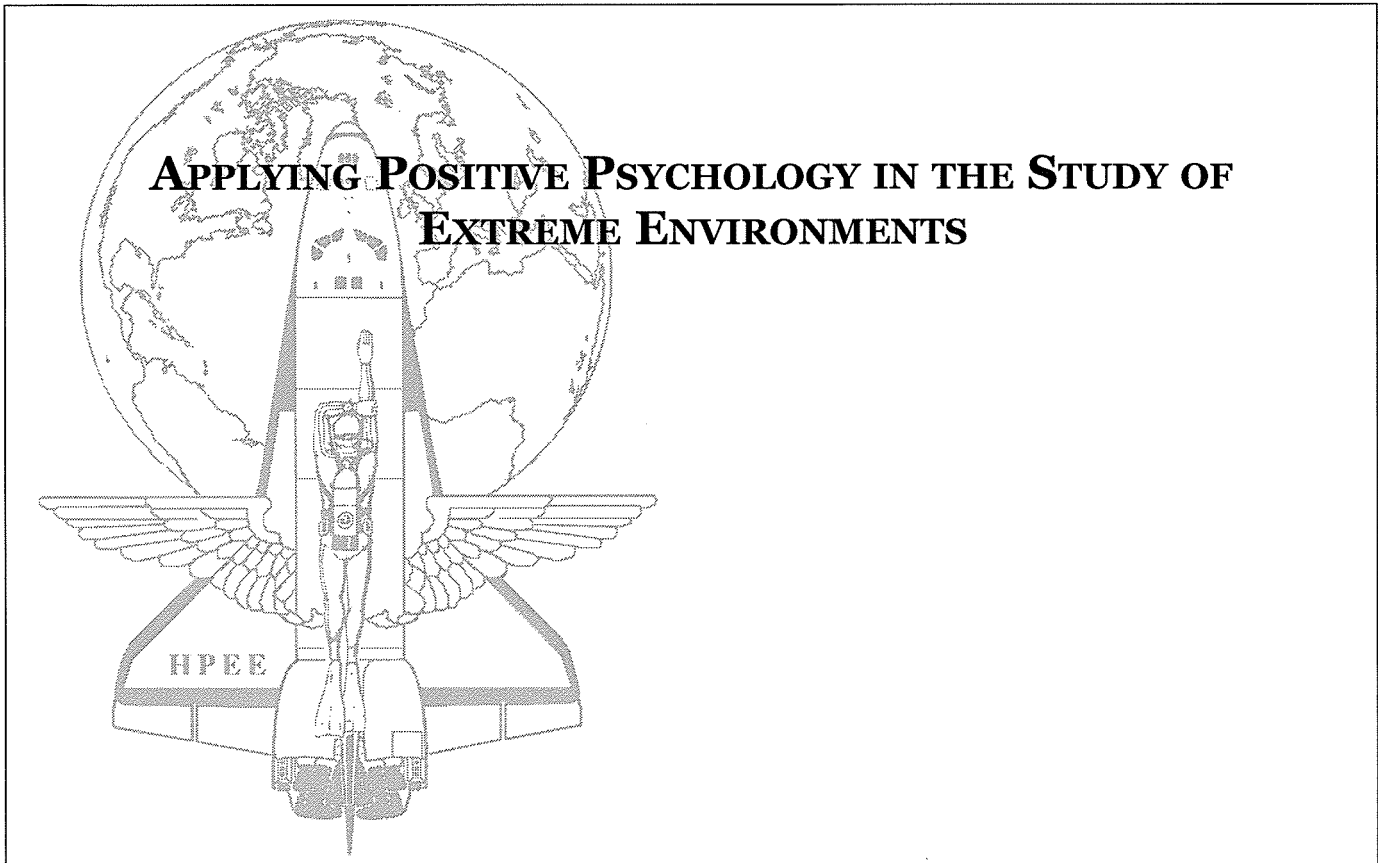
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**Peter Suedfeld**<sup>1</sup>, University of British Columbia

The work of social and behavioral scientists in isolated, confined environments (ICEs) and Extreme and Unusual Environments (EUEs)<sup>2</sup> has been essentially problem-oriented. In the case of the Antarctic, for instance, both COMNAP (the Committee of Managers of Antarctic National Programs) and the Working Group on Human Biology and Medicine of SCAR (the Scientific Committee on Antarctic Research) have been primarily concerned with minimizing the psychological vulnerability of people sent to Antarctic stations. This process has had two major components: selecting out (i.e., eliminating from the crew people who do not fit

some profile of expeditioners who are likely to be successful), and providing countermeasures in the form of environmental design, medications, psychological support, and evacuation for the occasions on which selection has failed. A similar ethos underlies the traditional selection procedures for NASA astronauts (see, e.g., Santy, 1994; Suedfeld & Steel, 2000).

This approach, which we may call the *pathogenic* (disease-producing) or *negative psychology* orientation, fits the traditional model of psychological assessment and intervention. Psychiatrists and clinical psychologists, the major architects of such programs, are trained to diagnose, prevent, and treat problems of adjustment.

When they look at the conditions of people in ICEs/EUEs, including but not limited to polar stations, they see potential problems arising from the peculiar characteristics of the environment (Table 1).

When they read the narratives of people who have been to those places, they note the many men-

**Table 1. Negative Psychology (Pathogenic Approach) Physical Characteristics of ICEs/EUEs**

<b>Environmental Characteristic</b>	<b>Environments</b>
Dangerous exterior environment	Polar stations, spacecraft, mountain climbing, submarines (incl. submersibles), expeditions
High-tech life support system	Spacecraft, submarines, Biosphere 2
Restricted interior space	All ICEs, by definition
Isolation from usual social networks and physical stimuli	All ICEs, by definition; also, mining camps, military ops, Biosphere 2, expeditions
Physical discomfort	All of the above
Obstructed external visibility	Polar stations, spacecraft, submarines
Elaborate protective clothing	Polar stations, spacecraft, submarines
Unusual photoperiodicity	Polar stations, spacecraft
Lack of privacy, crowding	Polar stations, spacecraft, ship and military ops, submarines, airline crews
Possibility of sudden disaster	Polar stations, spacecraft, ship and military ops, submarines, airline crews, oil rigs, expeditions

tions of danger, deprivation, discomfort, loneliness — in one popular word, *stress*. They know that stress is bad, and that people who are under too much stress or under stress for too long tend to deteriorate in mind, body, and performance. Some of them may even have read the relevant studies on ICE stress: insomnia, altered states, interpersonal friction, cognitive decrements, poor personal hygiene, and all. Table 2 shows some of the more common psychological risks identified in ICEs and EUEs.

This concentration, which may be characterized as negative psychology, has been useful in some aspects of mission design. However, it has also predicted many dire problems that did not occur. Hallucinations, severe intellectual decrements, murderous feuds and rages, and psychosis-like reactions rarely occur in ICEs and EUEs. More to the point of this paper, researchers working from the negative psychology viewpoint have been largely silent on the beneficial effects of experiencing such environments.

**Table 2. Negative Psychology (Pathogenic Approach) Psychologically Relevant Aspects of ICEs/EUEs**

<b>Psychological Characteristic</b>	<b>Environments</b>
Demanding work, emergencies	Space crews, disaster teams, executives, military operations, expeditions
Long stretches of "empty time"	Polar stations, space crews, isolation chambers, solitary confinement, oil rigs, mining camps, ship & military operations
Unusual circadian rhythms	Polar stations, space crews, shift workers, airline crews, submarines/submersibles
Problems "at home"	Polar stations, space crews, oil rigs, ships, submarines/submersibles, etc.
Narrowed cognitive focus	Emergency crews, decision-makers under stress
Reduced environmental control	Polar stations, space crews, prisoners, hospital patients, submarines/submersibles
Cross-cultural differences	Antarctic stations, space crews, aid workers, military combined ops, peacekeepers
Flattened leadership hierarchy	Polar stations, space crews, expeditioners, mountain climbers
Excessive interpersonal intimacy, lack of privacy	Polar stations, space crews, mining etc. camps, expeditioners, submarines/submersibles
Interaction with "management"	Polar stations, space crews, Biosphere 2, military ops, peacekeepers

I would like us to consider more seriously the opposite approach, a *salutogenic* (health-producing) or *positive psychology orientation* (Antonovsky, 1987; Seligman & Csikszentmihalyi, 2000). Such an approach would argue that, while problems do exist in ICEs and EUEs, and must be guarded against and dealt with, their existence does not exhaust the psychologically relevant conditions one finds in such situations. In fact,

This approach and the results of some of the studies deriving from it have been interesting and useful, but I believe that they have overlooked an important aspect of many ICE/EUE experiences. Reactions to stress should be conceived as lying along a dimension, from failure (physical and/or psychological breakdown, traumatic and post-traumatic stress disorders) through resilience (the ability to bounce back after negative reactions), successful coping (dealing with the stressor without breakdown or damage) to salutogenesis, the enhancement of physical and psychological strengths. So far, researchers have concentrated almost entirely on the breakdown to coping portion of that dimension.

the environmental characteristics of ICEs/EUEs, as perceived and described by their inhabitants, include many highly desirable aspects. Table 3 shows some of these.

In designing psychosocial research projects to be conducted in

**Table 3. Positive Psychology (Salutogenic Approach) Characteristics of ICEs/EUEs**

<b>Environmental Characteristic</b>	<b>Environments</b>
Natural grandeur, vastness, beauty	Space vehicles, polar stations, oil rigs, ships, expeditions
Mystery	All of the above; submarines/submersibles
Efficiency	Spacecraft, polar, submarine/submersible, ships
Coziness	All of the above
Comfort	Polar stations, ships
Novelty / Familiarity	All of the above
Improvisation	All of the above
Free time	All of the above; solitary confinement
Time out from daily hassles	All of the above; solitary confinement
Social group characteristics	Spacecraft, polar stations, military ops, submarines/submersibles, oil rigs, mining etc. camps, expeditions
Camaraderie	
Intimacy	
Interdependence, mutual help	
Superordinate goals	
Belonging to elite	

environments like space vehicles, polar stations, and other ICEs (as well as in planned, as opposed to accidental or traumatic, sojourns in EUEs), due attention should be paid to positive psychology. If selection is an issue, the research should cover selecting *in*, as well as *out*: that is, finding the best people for the job and the place, those who will enjoy it and flourish in it, not just eliminating those who won't deteriorate or crack up. Instead of, or as well as, clinically-oriented scales and psychiatric interviews, selection researchers could use positively oriented instruments. These might include measures of optimism and sense of agency and control (Bandura, 2001; Taylor et al., 2000); resilience and hardiness, the ability to understand, withstand, and deal with difficult situations (e.g., Kobasa, 1979); salutogenesis, the ability to actually profit, physically, psychologically and spiritually, from such experiences (Antonovsky, 1987); and the NEO Personality Inventory (Costa & McCrae, 1985), whose factors closely resemble the characteristics we might find in optimally functioning ICE dwellers: openness to new experiences and ideas, conscientiousness at work, sociability without intrusiveness, and emotional stability (Suedfeld & Steel, 2000).

Researchers should also concentrate on a related and mostly neglected topic, following up the selection data to see how the measures correlate with actual reactions — physiological, emotional, cognitive, social, and behavioral — in the ICE. Measures that balance attention to positive as well as negative reactions, such as the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988), could be substituted for those that concentrate entirely, or lopsidedly, on negative ones.

Going beyond personnel selection, negative psychology does not address the dedication to making all the needed preparations that lead to the tired but confident state of some polar crew members and astronauts even before their mission begins, or the similar dedication to the mission that leads crew members to sacrifice free time or sleep time in order to put in extra work. Approaching the study of ICE behavior from a positive orientation, researchers could measure the degree to which crew members in an ICE find their sojourn an opportunity to stretch themselves, to be all that they can be; to enjoy the close camaraderie of like-minded others; to feel the exhilaration of looking out at a vast Antarctic ice field, or through a Space Shuttle porthole at the Earth or the infinity of

space; to lose themselves in the beauty of the landscape or the rhythm of their work; to enjoy both the novelty of the situation and its increasing familiarity; to structure and decorate the inside environment so as to make it homelike and cozy, not just cramped and crowded; to improvise creatively in solving unforeseen problems or in improving adequate features and making them superior; to work together in achieving something new and important, which none could achieve alone; to contemplate and reflect, and to come out with a new appreciation of values previously overlooked in the hurly-burly of modern technological society.

Perhaps the best known example of the rare quantitative study focusing on positive results is Palinkas' (e.g., 1986) report of the salutogenic consequences of wintering over. The study was unique among ICE/EUE studies in the large size of its sample, its long-term follow-up, and the rigor of its methodology; but it included only US Navy winter-over personnel. These impressive data are therefore restricted in generalizability. The work needs to be replicated with a greater variety of participants and environments, and expanded to pay more attention to psychological outcomes.

In post-mission follow-ups, the emphasis has again been on problems. But many returning veterans of ICE/EUE sojourns have commented upon their greater appreciation of values and ideas previously neglected, their increased self-confidence and skill in facing challenges, their pride in having proven themselves, and their improved relations with others. Reintegration into the family, which certainly has problems, may also involve a surge of closeness, enjoyment, and love. The pleasure of reminiscing and talking about the ICE or EUE is also a positive post-mission feature. Last, we all know that many Antarctic expeditioners, explorers, submariners, and spacefarers love their ICE and itch to go back there; we should explore the reasons for, and outcomes of, such reactions.

Social and behavioral scientists have tended in the past to ignore these possible benefits, even though there are theories to predict and explain them, instruments by which to assess them, and earlier data or at least reports to support their reality and importance. Table 4 gives some illustrative examples, deliberately chosen to represent many areas of psychological research, spanning about five decades (positive psychology is not really a brand-new dis-

**Table 4. Positive Psychology (Salutogenic Approach) Psychological Reactions to ICEs/EUEs**

Aesthetic reactions to the environment (Appleton, 1982; Berlyne, 1974)  
 Affiliation, intimacy (Atkinson, 1958; Maslow, 1987)  
 Achievement, agency, effectance, mastery (Bandura, 2000; Helmreich et al., 1978; McClelland, 1961; White, 1959)  
 Cooperative work and play, superordinate goals (Aronson & Osherow, 1980; Sherif, 1958)  
 Courage, resoluteness, indomitability (Klausner, 1968; Rachman, 1990; Suedfeld, 1998)  
 Excitement, curiosity (Apter, 1992; Day, 1971; Zuckerman, 1984)  
 Flow experience (Csikszentmihalyi & Csikszentmihalyi, 1988)  
 Hardiness, resiliency, coping (Anthony & Cohler, 1987; Kobasa, 1979; Lazarus & Folkman, 1984; Taylor et al., 2000)  
 Improved health (Antonovsky, 1987; Palinkas, 1986)  
 Ingroup solidarity, cohesiveness, shared values (Aronson & Mills, 1959; Cartwright & Zander, 1968; Janis, 1989)  
 Individuation, freedom from societal constraints (Brehm, 1966; Snyder & Fromkin, 1980)  
 Reflection, contemplation (Cacioppo & Petty, 1982; Storr, 1988)  
 Self-actualization, peak experience, altered consciousness (Maslow, 1987; White, 1998)  
 Sense of values (Rokeach, 1973)



covery!), with clear implications for a positive research thrust dealing with ICEs/EUEs.

There are many anecdotal reports, diaries, autobiographical narratives, and other non-research sources that identify positive aspects of the ICE/EUE world and explore the subjective psychology of the range of responses from coping to salutogenesis (see, for example, Harrison, 2001; Riffenburgh, 1994; Mocellin & Suedfeld, 1991; or the narrative of almost any space or polar explorer). Drawing upon this literature to generate hypotheses, and then testing them by rigorous, objective, statistically analyzable techniques, would convincingly illustrate the possibilities inherent in the synergistic interaction between qualitative and quantitative research methodology (Suedfeld & Soriano, 1998). It would also provide researchers, theorists, practitioners, and potential recruits with a more complete understanding of human reactions to ICE/EUE environments.

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#### Footnotes

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<sup>2</sup> ICEs and EUEs form overlapping, but not redundant, categories of environments. For example, the crew of a supertanker sailing across the ocean is in an ICE, but not an EUE; a group of tourists joining an Inuit hunting party on the Arctic ice are in an EUE, but not an ICE. Many environments of research interest — space capsules, polar stations, submersibles, and the like — belong to the overlap between the two categories. This and other taxonomic issues are further elaborated in, *inter alia*, Suedfeld, 1987; Suedfeld & Steel, 2000. Most of this paper refers to ICEs, or ICEs located within EUEs.