



# Examining personal values in extreme environment contexts: Revisiting the question of generalizability



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## ABSTRACT

Land-based extreme environments (e.g. polar expeditions, Antarctic research stations, confinement chambers) have often been used as analog settings for spaceflight. These settings share similarities with the conditions experienced during space missions, including confinement, isolation and limited possibilities for evacuation. To determine the utility of analog settings for understanding human spaceflight, researchers have examined the extent to which the individual characteristics (e.g., personality) of people operating in extreme environments can be generalized across contexts (Sandal, 2000) [1]. Building on previous work, and utilising new and pre-existing data, the present study examined the extent to which personal value motives could be generalized across extreme environments. Four populations were assessed; mountaineers ( $N = 59$ ), military personnel ( $N = 25$ ), Antarctic over-winterers ( $N = 21$ ) and Mars simulation participants ( $N = 12$ ). All participants completed the Portrait Values Questionnaire (PVQ; Schwartz; 2) capturing information on 10 personal values. Rank scores suggest that all groups identified Self-direction, Stimulation, Universalism and Benevolence as important values and acknowledged Power and Tradition as being low priorities. Results from difference testing suggest the extreme environment groups were most comparable on Self-direction, Stimulation, Benevolence, Tradition and Security. There were significant between-group differences on five of the ten values. Overall, findings pinpointed specific values that may be important for functioning in challenging environments. However, the differences that emerged on certain values highlight the importance of considering the specific population when comparing results across extreme settings. We recommend that further research examine the impact of personal value motives on indicators of adjustment, group working, and performance. Information from such studies could then be used to aid selection and training processes for personnel operating in extreme settings, and in space.

## 1. Introduction

Researchers investigating issues related to human spaceflight often utilize analog settings (e.g., Antarctic research stations, polar expeditions) in order to understand psychological functioning and how to manage potential problems that might occur in space. Over recent years, there has been a growing interest in the value systems of personnel operating in EUE and in ICE analog settings. Studies have been carried out examining the personal values of Arctic military patrol teams [3], polar expedition groups [4], astronauts and cosmonauts [5–9], and participants in space simulation studies [10,11]. Given that values offer information on motivational sources and may help understand how people cope with stress, it is not surprising that this topic

has become a focus in extreme environment research.

While a more concerted effort to assess personal values has occurred relatively recently, interest in the personal characteristics of individuals performing in EUE and ICE environments has a much longer history [12–14]. In fact, there are a plethora of studies examining the personality factors of individuals and teams operating in extreme settings. This includes polar expedition members [15,16], military personnel [3], Antarctic over-winterers [17–19], submarine operators [20,21], and astronauts [22].

Commensurate with the popularity of studying personality in different types of EUE and ICEs, attempts have been made to establish whether findings related to personality can be generalized across extreme settings [1]. Initial evidence suggests that there are likely to be shared personality characteristics of those operating in a range of challenging environments

*Abbreviations/Acronyms:* EUE, Extreme and Unusual Environment; ICE, Isolated and Confined Environment; IBMP, Institute for Bio-Medical Problems; ESA, European Space Agency; Roscosmos, Russian Space Agency; PVQ, Portrait Values Questionnaire

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[23]. These shared characteristics may also be relevant to other personal factors, such as personal values, which have recently been linked to adjustment, optimal performance, and intergroup working in extreme conditions [10,11]. If certain values are consistent across extreme groups, this may tell us something about who is likely to adjust and cope well in challenging environments. These types of comparison also inform us about factors that have implications for generalizing other forms of psychological data.

It is important to note that although personality traits and values show meaningful associations they are not the same. Traits are “dimensions of individual differences in tendencies to show consistent patterns of thoughts, feelings and actions” [24]. Hence, traits are enduring dispositions. In contrast, values are enduring goals. Traits describe “what people are like,” rather than the intentions behind their behavior. Values refer to “what people consider important,” and the goals they wish to pursue. Thus values will indicate what the motivational sources of the person are. Although attempts have been made to generalize personality across EUE and ICEs, there has been a limited attempt to compare the values of those operating in different types of EUE and ICE setting.

### 1.1. Personal values in extreme environments

Schwartz [2] conceptualized values as “broad motivational goals of varying importance” that guide attention and action towards social, intellectual and emotional opportunities. Within the taxonomy of personal values proposed, 10 distinct motivationally relevant values have been identified and shown to hold relevance across a variety of cultures and backgrounds (see Table 1 in text for definitions). The personal values model has been extensively tested and there are now data on over 60,000 people from more than 60 countries around the world. Results from such studies have led to an established understanding of the role of values in relation to the attitudes, behaviors and social experience of people from many different backgrounds [25]. Previous research suggests that value orientations differ across individuals and cultures [26], and value heterogeneity may therefore be larger in international teams. The increasing cultural diversity of individuals engaged in extreme environment pursuits, including individuals preparing for space missions, suggests that the study of personal values among these groups would be of interest.

Examination of personal values in recent extreme environment studies [3,10,11] might also reflect the need to identify valid measures for assessing individual motivation as well as factors that potentially may impact upon interpersonal compatibility [27]. For instance, researchers have [28] suggested that value compatibility may form

the basis for interpersonal attraction and group cohesion. Furthermore, while personality provides an assessment of “what people are like”, values provide an appreciation of motivational goals, which then may serve as a guideline for action [25,26]. Leon et al. [4] also highlight that values serve as a justification for choices made and provide standards for judging oneself and others.

The utility then of assessing the values of people performing in extreme environments lies in the potential to better understand behavior and predict the manner in which individuals are likely to work with others in challenging situations. Indeed, personal values have been associated with a variety of behaviors relevant to performance in extreme environments such as the extent to which individuals are likely to cooperate with one another [29], work towards important goals [30], engage in pro-social behaviors [31], and experience flow [32]. Therefore, information on personal values can be informative in selecting people to operate in extreme contexts and in particular for the composition of teams working in isolation and confinement e.g., long duration space missions [33]. As such, it is not surprising that assessments of motivation (linked to personal values) are considered important by space agencies when selecting astronauts for completing missions in space [27,34]. In addition, issues related to motivation are likely to become ever-more important with the increasing duration of space missions and the possibility to travel into deep space.

Although several studies have been conducted on personal values of individuals performing in extreme environments [3,4,10,11], attempts to compare the value systems of personnel operating in different EUE and ICE settings are sparse. With respect to the various analog environments mentioned earlier, there are a number of differences in terms of crew size (i.e., solo vs. group), mission duration (short vs. long), the types of selection and training of crew (no formal training vs. intensive protocols), and the physical characteristics of the environment (i.e., confined habitat vs. environmental exposure). However, despite the differences between space analog environments, Palinkas and Suedfeld [14] emphasized that ecological validity is determined by the psychological experience of people within such contexts. Therefore, understanding the similarities and differences in people's priorities and values within and between different analog settings may help identify individuals and groups who adjust and perform well both during and following exposure to challenging situations [16,17]. The proposition that certain individuals would be more suited to work in challenging settings is consistent with tenets of the person-organization fit paradigm [35], which suggest that people are likely to be attracted to contexts that match their own values and interests. If there are values that are consistent to individuals operating in different types of challenging situation, this could be informative to a variety of organizations tasked with identifying and selecting candidates for working in stressful conditions.

In recent space simulation research, Sandal and colleagues [10,11] examined the values of a small number of personnel confined in a structure simulating a spacecraft enroute to Mars (Mars105 and Mars500 studies). The aim of the research was to establish whether individuals' values became more aligned over time within the confined environment. The findings were also evaluated in relation to assessments of interpersonal tension to establish whether value differences could account for struggles within the group. Overall, crewmembers in both simulations endorsed values of self-direction, benevolence and stimulation. These findings suggest that the crewmembers valued being creative and working autonomously, maintaining positive relations with others, and enjoyed challenges and novel experiences. Following confinement, it was also concluded that interpersonal tensions resulted from differences in benevolence, hedonism and tradition [7].

Studying other types of expedition groups, Leon et al. [4] and Kjergaard et al. [2] examined personal values before and after engagement in expeditions in the extreme environmental conditions of the Arctic. A number of commonalities in personal values were found. All of the expedition-goers assessed placed priority on values of self-direction and stimulation, and to some extent, benevolence. Similar to those

**Table 1**  
10 Personal values.

Personal Value	Definition
Power	Having social status, prestige and power over others
Achievement	Personal success through demonstrating competence according to social standards
Hedonism	Pleasure and enjoyment
Stimulation	Enjoys challenge, variety and novelty in life
Self-direction	Independent thought, action-choosing, likes to explore
Universalism	Having an understanding and appreciation for the welfare of people and nature
Benevolence	Preserving and promoting the welfare of people with whom you are in regular personal contact
Tradition	Respecting and accepting the customs associated with one's religion or culture
Conformity	Restraining actions and impulses in order to maintain social norms and minimize the chance of upsetting others
Security	Safety, harmony and stability of others, the environment and the self

Note: Definitions adapted from Schwartz [25].

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