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Review

Gaining deeper insight into the psychological challenges of human spaceflight: The role of motivational dynamics

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ABSTRACT

Past research in space psychology has produced a plethora of interesting findings with regard to the psychological stressors and benefits associated with human spaceflight. To help synthesize these rather scattered findings and to advance our theorizing about critical psychological phenomena and processes within the rapidly growing field of space psychology, the aim of this contribution is to approach them from the perspective of Self-Determination Theory (SDT; [1] Ryan & Deci, 2000 [1]), a broad theory on human motivation and development. Specifically, we argue that the postulation of the psychological needs for autonomy, competence, and relatedness within SDT allows for (1) a deeper understanding of reported psychological phenomena in current spaceflights and (2) the development of measures to alleviate the negative psychological stressors as well as to enhance the benefits associated with spaceflight.

Contents

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[1] Self-Determination Theory.

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1. Introduction

With the launch of Yuri Gagarin on April 12, 1961, the first man in space, a brand new field in human sciences was born: space psychology. Since then, a substantial amount of research has been conducted to reveal the personal and interpersonal stressors astronauts face when in outer space. In fact, the field of space psychology has been rapidly evolving, thereby producing a number of interesting insights into a broad diversity of phenomena [2,3]. Unfortunately, the findings of these studies remain somewhat disconnected and rather descriptive in nature, thereby lacking a strong theoretical foundation that would allow for greater synthesis between them and for a deeper understanding of their underlying psychological dynamics. Therefore, at this point, the field may benefit from the reliance on an overarching theoretical framework, which would allow for a more unified, coherent, and efficient development of ongoing and future research.

One theory that is ideally suited to fill this void in the literature is Self-Determination Theory (SDT) [1,4], a broad theory on human motivation, development, and well-being. The theory has received wide-spread attention and has been used as a source of inspiration to study the motivational functioning, thriving, and well-being of individuals in diverse life domains, including health care, parenting, education, and environmental sciences, to name a few [5].

Central to SDT is the assumption of the existence of three inherent, psychological needs, that is, the need for autonomy (i.e., experiencing a sense of volition), the need for competence (i.e., experiencing a sense of effectiveness) and the need for relatedness (i.e., experiencing a sense of warmth). The satisfaction of these needs on a day-to-day basis is integral to individuals' well-being and flourishing, while also serving as a source of resilience against adversity [6,7]. Herein, we forward and develop the broader argument that the satisfaction of these psychological needs is equally critical for astronauts' well-being and performance and that their support will be of utmost importance during future Mars missions. In fact, as we are entering a new and fairly unknown era of human spaceflight, which is bound to yield new psychological challenges, a more holistic view on astronauts' functioning is likely to be helpful in formulating predictions about the future psychological challenges for a Mars crew.

The present review consists of three parts. In part one, we briefly discuss two critical topics within space psychology, namely crew autonomy and the beneficial effects of spaceflight, a topic that gained attention under the influence of the positive psychology movement. We opted for these two topics for a number of reasons, including the increasing attention they receive among space psychologists and space agencies [2], the conceptual confusion surrounding the notion of autonomy which can be resolved by taking an SDT-perspective [8,9], the natural fit between the positive psychology movement and SDT, and the fact that both topics are of crucial importance for future interplanetary travel [2,8]. Many other topics in space psychology could have been addressed, such as the issue of social isolation (e.g., [10]), family support (e.g., [11]) and crew-ground communications (e.g., [12]), to name a few. However, space limitations required us to be selective. In part two, we discuss a number of critical principles of SDT which set the foundation for part three, that is, the elucidation of the theoretical potential and applied value of SDT for the field of space psychology. Specifically, we will discuss how SDT's notion of psychological need satisfaction and its differentiated view on human motivation enable us to shed more light on the question of crew autonomy and the beneficial effects of spaceflight.

2. Critical topics in space psychology

2.1. Crew autonomy and bureaucracy

A topic of great discussion among space agencies is the question of crew autonomy. This issue concerns the decision-making authority of the flight crew, and is differentiated from the concept of autonomy as conceived within the framework of SDT, as will be discussed in Section 4.1. There is a tendency, especially in Western space agencies, to restrict the decision-making authority of the flight crew through a variety of detailed regulatory procedures [8,9,13,14]. The ISS crew, for instance, operates under a very strict set of rules and guidelines due to a combination of increasing bureaucratic demands and safety regulations imposed on astronauts. To illustrate, today's astronauts on the ISS cannot decide on their daily work schedule as their daily activities are completely planned by mission control on the ground and every change needs to be reported and evaluated by an expert team on Earth. Although mission control is sometimes willing to take astronauts' preferences into account, they generally are allowed little input and merely seem to be treated as “executive personnel”, “extensions of ISS” or “lab workers” (e.g. [8], p. 925).