**Introduction**

The Behavioral Health and Performance (BHP) Element is one of the six elements within the NASA Human Research Program (HRP) and is responsible for managing four risks: a) The Risk of Performance Decrements due to inadequate Cooperation, Coordination, Communication and Psychological Adaptation within a Team (Team), b) the Risk of Performance Errors due to Sleep Loss, Circadian Desynchronization, Fatigue and Work Overload (Sleep), c) Risk of Behavioral Conditions (BMed), and d) the Risk of Psychiatric Disorders (BMed).

The aim of this report is to address some of the recommendations made by the recent NASA HRP Standing Review Panel for the Behavioral Medicine Risk of Psychiatric Disorders. Such recommendations included: a) the inclusion of important national and international literature in English and non-English language materials; including journals, books, magazines, conference reports and b) an extensive literature review of certain types of psychological states to predict, detect, and assess adverse mental states that may negatively affect the psychological well being of the astronauts, specifically asthenia.

This evaluation was a collaborative international work effort focused on the evaluation and determination of the importance of continuing research on asthenia as a possible psychological problem that might affect the optimal psychological functioning among crewmembers during long-duration space flight missions.

Russian medical personnel (flight surgeons and psychologists) have observed symptoms of asthenia (weakness, increased fatigue, irritability, and attention and memory disorders) in cosmonauts after four months in space (Maysnikov & Zamaleddinov 1996; Grigoriev, 1996) and believe that asthenia is one of the greater risks that will affect crews’ optimal psychological functioning.

“If our diagnostic systems do not readily match the symptoms profiles presented, practitioners will continue to underdiagnose psychological disorders (Kessler et al. 1994; Üstün et al. 1995; Mason & Wilkinson, 1996 as cited in Hickie, 1997)”

**Methods**

This comprehensive international systematic literature review includes six phases: Phase 1: Inclusion and Exclusion criteria, Phase 2: Data collection, Phase 3: Initial evaluation of data, Phase 4: Interviews with experts, Phase 5: Analysis and interpretation, and Phase 6: Results. We examined physical, psychological and psychiatric literature that comprised studies involving astronauts and cosmonauts during short- and long-duration space flight missions. Countries included in the literature review were Canada, Germany, Spain, Japan, Czech Republic, Russia, U.S.A., U.K., Australia, and Switzerland, and, in the interview process, Canada, Germany, Spain, Japan, Czech Republic, Russia, and U.S.A.

Inclusion criteria included 1) journal articles, conferences, books, magazines, newspapers, empirical/quantitative studies with astronauts and cosmonauts; 2) time period: > to 2010; and 3) databases: PubMed, PsyInfo, Psych articles, ISI Web of Knowledge, PubMed, DynaMed, Access Medicine, MD Consult, STATREF, Diagnosaurus, East View Information Services, World Cat, Elsevier, ScienceDirect.

Exclusion criteria were: 1) technical reports, books, conference, newspapers, magazines, dissertations, commentaries, case-sample studies, literature reviews that were not representative of the astronaut or cosmonaut population and that were not related to the area of psychology, psychiatry, asthenia, mental health during long- and short-duration space flight missions.

**Table of international definitions of Asthenia**

<table>
<thead>
<tr>
<th>Author</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Skraila (2012)</td>
<td>Asthenia is described as a physical and mental state of overexertion, fatigue, and weakness, characterized by general lassitude and lack of energy, often associated with decreased motivation and an inability to perform even the most basic tasks.</td>
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<tr>
<td>Brain, 1883</td>
<td>Asthenia is a pathological fatigue, also associated with various non-physiological factors such as sleep deprivation, smoking, and alcohol consumption.</td>
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<tr>
<td>Yerny guidebook-1989</td>
<td>Asthenia is characterized by persistent feelings of tiredness and lack of energy, often accompanied by muscle weakness and reduced physical and mental performance.</td>
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**Preliminary Conclusions**

While Russia, China, Japan, and many European countries recognize asthenia, neurasthenia, or psychoasthenia as a psychological illness, North America does not. However, in the U.S., the symptoms of asthenia overlap with different psychological diagnoses such as depression, chronic fatigue, anxiety, and adjustment disorders.

The U.S. and Russia are the most experienced countries in supporting astronauts and cosmonauts in space. However, only the Russian program recognizes asthenia, neurasthenia, or psychoasthenia as a possible threat during long-duration missions.

The Behavioral Health and Performance research element is aware of the existence of asthenia in space and is currently developing an exhaustive international literature review and conducting interviews with experts in the area of space psychology and psychiatry. International collaborative research in this area is sorely needed to determine and evaluate whether asthenia is a potential psychological problem that adversely affects the optimal psychological functioning of crewmembers for future long-duration space flight missions of extended duration and/or beyond Low-Earth orbit.

**Selected References**


