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THE VIRTUAL SPACE STATION AT AGE 10: A SOFTWARE PLATFORM FOR PSYCHOSOCIAL SUPPORT

Abstract

Purpose

Psychosocial problems—both team and neurobehavioral—pose a major challenge to the success of long-duration space missions. Space crews must function autonomously to complete long-duration missions beyond Earth's orbit successfully, including the detection and management of medical and psychosocial problems. Self-guided software can be designed to help flyers to prevent, detect, assess, and manage their own problems that could occur on missions, thereby supporting crew autonomy.

Methodology

The Virtual Space Station (VSS) is a suite of self-guided tools to help astronauts prevent, detect, assess, and manage psychosocial problems that can arise on extended missions. The VSS utilizes interactive video, audio, animations, graphics and text. It is modular and expandable, to accommodate future components. The program is delivered on a flashdrive, and only the astronaut has access to his or her data, which is encrypted and password protected. It is the product of four major research projects by multiple teams spanning over 10 years.

Study 1 involved the development and formative evaluation the VSS's architecture and data management processes, as well as the production of demonstration content related to conflict management training and depression assessment. It began with interviews of 13 veteran long-duration flyers from the ISS, Mir, and Skylab about best practices for managing psychosocial stress in space, and concluded with a usability and acceptability evaluation by 11 NASA astronauts.

Study 2 involved the development and pilot testing of an intervention for depression. It involved adapting an evidence-based treatment for depression, problem-solving therapy, for computer-automated delivery. A larger clinical trial is currently underway.

Study 3 involved the development and randomized controlled trial of a computer-automated intervention for chronic stress that utilized empirically-supported cognitive-behavioral therapy techniques.

Study 4 (currently underway) involves the development of a computer-automated intervention for interpersonal conflict. It also adapts cognitive-behavioral therapy techniques, and will be tested with fire fighters in the U.S., as an analogue population to astronauts.

Results

The CRL and TRL levels of VSS components have increased, and the VSS is in the process of being transitioned to NASA. Moreover, the VSS design is being adapted by a U.S. medical center to provide computer-automated behavioral health evaluations and treatments to patients. And, portions of the VSS are in the process of becoming commercialized.

Conclusions

The VSS is an example of technology supported by space research that can benefit not just flyers, but the greater public. A brief demonstration of the VSS will be provided.