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Behavior, Performance and Psychosocial Issues in Space (1)

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USING A 'DISTINGUISHABLE PHASE MODEL' AS A PRE-MISSION AWARENESS TOOL TO IMPROVE CREW PERFORMANCE AND GROUP DYNAMIC DEVELOPMENT

Abstract

Introduction: Crew performance and group dynamic development in space has become an increasing focus due to the recent shift towards longer-duration human space missions to the Moon and Mars. Several Earth exploration crews of the 19th and 20th centuries recorded diary accounts of aspects such as crew functioning and group cohesion which have provided useful insights into critical human elements that may be associated with exploration in isolated and confined (or semi-confined) environments. **Purpose:** This study investigates the use of a Distinguishable Phase Model as a pre-mission communication and training tool to help crews prepare for the pre- and intra-mission phases of a mission. The model first divides the mission duration into four distinct phases: initial, intermediate, long-duration, and final; where it can be used as a comparison tool to identify (or suggest) when critical components such as mission mistakes, crew stress, motivation degradation, etc. may arise, which can aid in the reduction of factors that negatively affect group dynamic development. While the model will suggest when these negative factors could present themselves during a mission, the analysis will also focus on positive aspects that contribute to positive group cohesion regardless of the frequency and location of mistakes during the mission. Furthermore, the study will suggest the addition of a fifth phase (aftereffects of the mission), which will focus on crewmember interpersonal relationships in the following respects: with the crew as a whole, with the supporting organization/space agency, and with regards to the return to family and home life. **Methods:** Early investigations of this model were applied in a comparison of the Lewis and Clark Expedition (1803-06) to space missions carried out on the MIR space station exemplifying long duration missions. More recently the comparison was extended to a shorter mission simulation carried

out at the Mars Desert Research Station in Utah, USA. **Results:** From these comparative studies the model was found to be a useful tool to identify when and where mistakes occurred during a mission and was reported by members of the MDRS crew to have played a positive role in the development of positive group dynamic development. It was also discovered that mistakes at certain mission phase points could be linked to factors such as habitat/spacecraft problems and crewmember perceived stress, which are amenable to prevention in the early pre-mission phase of a mission.