

Using the in-space astronaut psychology challenge as a model to solve adolescent mental health challenge

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The use of space technology has brought improvement in almost all facet of life. Some of these benefits are brought about by astronauts going for short term missions in the outer space such as on the space laboratories; while some of these benefits will be brought about going for long term missions (e.g. to the Moon or Mars) in the future. There are five major health risks for astronauts in the outer space. These risks pose to be factors affecting their psychological status. The risk factors are gravity-transition, distance from the Earth, radiation in space, isolation and hostile environment.

Most of these factors have effects on the behavior, emotion and cognition of space travelers, which may lead to mental health challenges affecting the mission objectives. A general overview of the risk factors are given in the development of mental health challenge for an astronaut in space; each factor is used as a model in relating it to adolescent mental health challenge considering varying conditions of cause. The specific measures to increase astronauts psychological status in space is discussed; and the salient points are recommendations for adolescents on earth, specifically those in the isolated locations.

Key Words: *Astronaut, Model, Psychology, Adolescent.*

INTRODUCTION

There are great benefits in exploring the outer space. Some of these benefits are in improving health care, education, communication, disaster management, weather forecasting, and land and water resources management. Many short term missions to the outer space have been exploited, therefore long term missions into deep space (solar system) such as man's settlement on the Moon or in the Mars are under-way. The journey to the Mars will take about 3 years and therefore all the challenges need to be looked into very well and summoned. As a result of the long duration space flight, it is anticipated that mental health challenges may develop on space explorers because of some unavoidable risk factors in the deep space. Each of these factors are used as models upon which each of the underlining cause of the mental health challenge of adolescents can be anchored.

Childhood and adolescence are vital stages in life for mental health. It is a period when rapid growth and development occur in the brain. Adolescents gain cognitive and social emotional skills that put their future mental health in shape which are therefore crucial for their proposed adult roles in the society. The features of the environment where adolescents grow up from shape their well-being and development. Early in life negative experiences in the homes, schools, and neighborhood or on the internet and social media increase the risk of mental illness. Such exposures include physical violence, poverty and feeding challenge, bullying, anxiety, maltreatment, harsh parenting (verbal aggression-e.g. yelling; physical aggression-e.g. spanking, hitting), parental divorce, mental illness of a parent/caregiver, sexual violence (e.g. rape), developmental disabilities, been an orphan etc. All these can actually cause depression having effects on adolescents' behavior, emotion and cognition.

LITERATURE REVIEW

Risk factors in the proposed long duration space manned mission as a model to determine possible adolescent mental health challenges

The major risk factors in a proposed long term manned mission are gravity transition, distance from the Earth, radiation of space, isolation and hostile environment [1]. Space travelers experience changes in gravity fields. On the Earth is 9.807 m/s² gravity, once in the outer space, microgravity is experienced while in the celestial bodies, reduced gravity will be experienced (Moon-0.17 m/s²; Mars-3.8 m/s². This may or may not affect the psychology of astronauts. Examples of transitions on an adolescent can be maybe the parents were rich before and then they become suddenly poor; caring parents, guardian and neighbors becoming wicked; family members that

were together becoming separated etc. This transition encompasses an experience that is opposite to the initially enjoyed condition. All these can lead to mental health challenge in adolescents.

It will take the space explorers about 3 years to get to Mars. This can really have negative effects on astronaut psychology. For an adolescent, everything that causes a distance between them and their loved ones or between them and their happy moments can pose a challenge on their mental health. Separation from one of the parents which may be caused by parental divorce; or leaving the places that make them happy such as specific play grounds, spiritual worship places etc. can affect their emotions.

The two major characteristics of the space environment are radiation and microgravity. Radiation in the space environ is one of the most significant risk factors for astronauts' health in the long duration space missions. The proposed long term space travel to Mars for example is a great challenge because of the high doses of space radiation. Research is on-going on this aspect as to how to protect human, more than what is currently experienced in the short term manned space missions such as to the space laboratories [2,3]. The proposed way out to space radiation on celestial body is wearing of spacesuit and burying the habitat [4]. Radiation affects the Central Nervous System (CNS) of man which could therefore affect the brain structure and function. This can lead to mental health challenge. Also, microgravity causes changed sensory input confusing the brain and causing occasional disorientation [5]. In an adolescent, this represents physical torture. It could be caused by the adolescent living with a relative or family friend that does not love them. Or could be an adult who gets angry and beats the adolescent mercilessly (physical aggression) e.g. teacher beating pupils or students on their heads. This can lead to minor or permanent damage to the brain of the adolescent, causing cognitive and mental health challenge.

The space environment is an isolated or confined environment. Before the space crew gets to their destination, the spaceship is a confined vehicle; and more so even after getting to the space laboratory or the celestial body, there is limitation to their movement. Therefore, there are various aspects that could contribute to the overall changes in mental health of astronauts as a result of their isolation, these are: interpersonal stressors, effects of long term microgravity and radiation, extreme isolation and loneliness, limited social contacts and novelty, Earth-out-of-view phenomenon challenge, lack of support from Earth due to communication delays, family problems at home, increased home sickness, sufficient sleep and food type deprivation. All these contribute negatively to the mental health of astronauts. Adolescents may be isolated physically, mentally or emotionally. In the physical, they may want to

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go out to play, but they are restricted by those they are living with. Mentally, they may have academic challenge but because their teacher, parent or guardians are not approachable, then they keep to themselves. Emotionally, they may have some issues bothering them such as sexual violence and they keep this to themselves. All these could lead to mental health challenge.

As a result of the space environment been a hostile environment because of microgravity effects on astronauts' physiology, it can lead to mental health challenge. The spaceship and the crew habitat (proposed) in celestial bodies are closed environment as Environmental Control and Life Support System (ECLSS) is active. The space environment can have effects on astronauts' food; this also determines the type of foods astronauts can carry along to space, making them to be denied certain foods; this can also cause psychological challenge. Due to microgravity: there is weakening of physiological systems; affecting the musculoskeletal system; and leading to bone disuse symptoms that include the loss of calcium, phosphorus, and nitrogen, and decreased bone size and volume [6]. There are short term and long term effects of microgravity. Only recently has study started looking into long term health effects of microgravity, as currently there are many unknowns as regard to deep spaceflight. As a result of microgravity, astronauts experience lack of appetite, headaches, emotional-instability, fatigue, irritability, sleep-disturbance, depression and anxiety [5]. In adolescents, this can represent some issues that make them not to eat sufficiently, or issues that prevent them from eating nutritious foods. This can be caused by poverty, bullying by older ones, maltreatment, harsh parenting, lack of appetite, emotional-instability, fatigue, irritability, sleep-disturbance, depression, anxiety etc. All these can affect the psychology negatively; and not eating well may cause developmental disabilities which can run into their adulthood (long term).

Ways of increasing the Psychological Status of Astronauts and Mental Health Challenged Adolescents

The following are some ways to improve the psychological status of astronauts; results that are also recommended to specific adolescence mental health challenge.

- The use of crew-care packages such as surprises and psychoactive medications would be great. A better care and surprises will also increase the morale of adolescents.
- Because of the isolation, there would be boring situations for astronauts; access to jokes, entertainment and nature like in-flight planting would help during this situation. Adolescents having access to nature, free time and play time would aid their mental health.
- The usefulness of verbal content analysis in identifying stress and in developing mental health challenges cannot be over-emphasized. Individuals that wish to nurture adolescents from charity homes should undergo verbal content analysis to determine if the adolescent can stay with them because of temperament.
- For home sicknesses, an easier workload, coupled with frequent private communication with families and friends back home, are important morale boosters [7,8]. Adolescents should be allowed to have flexible and easier house chores, while school assignments should be fun to do. This will aid their psychology.

- Each space traveler should be allowed to add preferential spice to their individual foods. That is, spice addition should be allowed to be added in-flight as space crew could be from different cultural backgrounds. Adolescents should be allowed to eat their choices of food as far as at the long run they still have their balanced diet. This will aid their psychology.

- Three-dimensional (3D) graphic zooming interface for self-assessment, training and other resources; and there is Virtual Space Station (VSS) research prototype for the treatment of interpersonal conflict stress and anxiety; these are specifically important for preventing mental health challenges of astronauts in space [9,10]. Telemedicine-based techniques in identifying stress and in identifying the development of mental health challenges are quite useful. Adolescents having access (even if is virtual) to see their loved ones (e.g. parent, sibling, teacher etc.), boosts their mental health.

CONCLUSION

The list of the factors possible to cause adolescent mental health challenge is not exhausted in this article, but the model serves as a pointer to possible causes. Mental health promotion and mental health challenge prevention/intervention in adolescents in this article aim to reinforce adolescent's capacity to regulate emotions give alternatives to build resilience for difficult situations. These in essence require a multi-level approach platforms e.g. social care, digital media, at schools or in the community, to reach the most susceptible adolescents.

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