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Stress-Related Growth in Two Challenging Conditions

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Abstract

In the last few years, attention has been given not only to negative impacts of stressful conditions but also to possible positive outcomes. The present study was devoted to personal growth in two challenging conditions in two samples of participants coming from different nations and different cultural backgrounds. The study extends existing knowledge by more intimate insight into the different facets of social and cognitive/affective personal growth. The experience of personal growth was individualized as far as the number of changes, their intensity, and facets/items in which the changes occurred.

Least affected was the spirituality area. The reason is probably that the conditions of our studies, no matter how stressful, were not strong enough to affect such a deeply intimate and strongly held individual process as is belief in God. The substantial point is that in both our studies the participants underwent no unexpected aversive event, but an undertaking of their own choosing.

Keywords: Mars-500, cruise, personal growth, spirituality, cognitive growth, social growth

Introduction

For much of the recent history of humankind, human beings have been exploring their environment despite the hazardous circumstances of such undertakings. Overseas as well as space expeditions are an inherent part of this area of human effort.

Aside from our expanding knowledge about the possible risks of solitary isolation and confinement and countermeasures to them (Gushin, 2002; Kanas, 2011; Kanas & Manzey, 2003; Kanas et al., 2002; Kanas et al.,2013; Leon, Sandal, & Larsen, 2011; Norris, Paton, & Ayton, 2010; Palinkas, 2001, 2003), we can also learn from issues focused on the positive aspects of such extreme conditions (Norris, Paton, & Ayton, 2010; Palinkas & Suefeld, 2008; Suefeld, 2001).

The purpose of the present study was to describe stress-related growth during a simulated to spaceflight, and an overseas study that can be to a certain extent conceived as an analog to spaceflight (Bishop, 2011).

Generally, conditions of isolation, and confinement, are defined by social deprivation together with social oversaturation, sameness of the environment, stimulus reduction, lack of usual sources of satisfaction, repetition of work routines, and monotonous crowded environments. The same group serves as a work team, leisure group, and "family" (Gushin, 1995; Kanas & Manzey, 2003; Leon, 1991; Palinkas, 2001; Sandal, 2004; Suefeld, Wilk, & Cassel, 2011). Moreover, the group is comprised of "persons not of one's choosing" (Leon, 1991, p. 743).

Stress-Related Growth

Going through challenging situations may result in psychological benefits. By stress-related growth are meant positive changes that follow stressful experience associated with stressful life events. Growth is enabled by an individual able to look back and identify positive outcomes related to a stressful event, mostly classified as positive changes in values and relationships.

According to Park (1998, p. 269), growth refers to any number of positive changes a person reports after encountering stressful experiences. Growth represents a resilient response to a stressful event (Zautra & Reich, 2011), where stressful experiences fundamentally change individuals for the better (Joseph, 2009). According to Zautra and Reich (2011), growth (in terms of Zautra's *new learning*) is one of three features that predominate in scientific discourse on resilience, the two others being recovery and sustainability.

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Mechanisms by which one can grow after a stressful experience are mostly explained by cognitive coping (Park & Fenster, 2004) and enabling an individual to see a negative event in a positive light.

Updegraff and Taylor (2000) characterized three important and consistent domains of change after a stressful experience: (1) self-concept, (2) relationships with social network, and (3) personal growth and life priorities. Similarly, Joseph (2009) pointed out three domains: (1) belief that one is a stronger person for the experience, (2) increase of one's appreciation of friends and family, a perception that these social ties have been strengthened, and (3) personal growth and life priorities, where reordered priorities may translate into changes in activities.

Park's construct of stress-related growth was originally conceptualized as consisting of three dimensions: social resources, personal resources, and coping skills. However, the analysis of Vaughn, Roesh and Aldridge (2009) of the stress-related growth scale showed a three-factor structure consisting of (a) cognitive/affective growth, (b) religious growth, and (c) social growth.

Method

Mars-500 Study

The Mars-500 experimental study was created to simulate a long-term mission to space. The duration of the simulation was almost 18 months.

Participants

The study comprised six volunteers, all male, between 27 and 38 years of age ($M = 32.16$; $SD = 4.99$) at the beginning of simulation. There were three Russians (one born in Tadzhikistan) and three non-Russians (one French, one Italian born in Colombia, and one Chinese) in the crew. The subjects gave informed consent prior to their participation, and they received a payment for their participation.

Equipment

The crewmembers spent their days in an experimental facility located in the Institute for Biomedical Problems in Moscow. The mission began on 3 June 2010 and ended on 4 November 2011. The crew simulated all the elements of the proposed Mars mission, i.e. travelling to Mars, orbiting it, landing, and returning to Earth.

The living conditions, such as communication; the food supply and the crew's diet; and levels of humidity, temperature, pressure, and gas composition were identical to that of the crews on the International Space Station. Also, the daily timeline was analogous to the schedule employed on the International Space Station; the crew performed maintenance, experiments, and other activities in a similar manner.

Measure and Procedure

Positive changes were assessed by the Stress-Related Growth Scale (SRGS; Park, Cohen, & Murch, 1996). The tool has been developed to capture personal growth in personal resources, social resources, and coping skills. The respondent is asked to respond to 50 items with either "0" (not at all), "1" (somewhat), or "2" (a great deal). The items are phrased as follows: "Because of this event…, in our design/*Because of Mars 500 experiment*, *I don't take most things for granted anymore; I learned how to reach out and help others.*" A higher score means higher growth (range: 0 to 100). The internal consistency (Cronbach's alpha) of the SRGS in validating the study (Park et al., 1996) was 0.94. The authors presented the SRGS as a one-factor measure; however, Vaughn et al. (2009) reported a three-factor structure of the scale with factors: (a) Cognitive/Affective Growth, (b) Religious Growth, and (c) Social Growth.

The SRGS was administered in a follow-up measurement in February 2012.

Cruise Study

The Cruise study was a 38-day voyage across the Indian Ocean on the historic sailing ship the *Oosterschelde*, a large reconstructed schooner originally built in 1918 and refurbished in 1988.

Equipment

The research itself was conducted during the voyage from the island of Mauritius to the Australian port of Perth from June 17 to July 28, 2013. The voyage lasted 38 days, and during that time the schooner travelled 4732 nautical miles. The crew of the *Oosterschelde* had limited supplies of food and water, medicine and medical care, as well as fuel, which accented the crew's dependence on good weather and wind. There was only one paramedic on board and many health problems were barely solvable on board. Satellite communication could potentially be used only in an emergency; therefore, the level of autonomy of the crew was very high, and all problems had to be dealt with without outside help.

Participants

The crew of the ship consisted of 15 people: seven professionals of the main crew and eight so-called "guests" from different European countries (predominantly Germany and The Netherlands) who took turns on watches. The participants of our study were all the members of the guest crew: three men (age range from 23 to 67, mean age 45.6); and five women (age range from 24 to 61, mean age 31.6).

The crew of the *Oosterschelde* worked in six-hour watches, with one rest. The duties of the watch included steering the ship, handling the sails, and daily maintenance

of the ship (basically cleaning, repainting metal constructions, greasing anchors, fixing running rigging, recycling waste, etc.). Although the crew was fully responsible for the course of all activities, the guest crew often participated fully in the activities of the crew, and the borders between the crew and the guest crew were completely eliminated during the voyage. The language of communication was English.

Measure and Procedure

Positive changes were assessed by the SRGS with the items phrased as follows: Because of my voyage on *Oosterschelde*… "*I learned how to reach out and help others.*"

The SRGS was administered in a follow-up measurement in October 2013.

Results

Both missions were successfully accomplished.

The number of items with positive answer in the SRGS ranged from 13 to 46 in the Mars-500 study and from 18 to 47 in the Cruise study (men: 32–43; women: 18–47). The range of score in the Mars-500 study was 15–71, in the Cruise study 18–72 (men: 51–60; women: 18–72).

A more detailed analysis of the stress-related growth classified according to (a) cognitive/affective, (b) religious, and (c) social area is displayed in Table 1.

An inspection of the items with the highest scores revealed that the highest scores corresponded to the items reflecting social growth ("*I developed new relationships with helpful others*"—Mars-500 study; "*I gained new knowledge about the world*"—Cruise study), followed by the items reflecting cognitive/affective growth ("*I realized I have a lot to offer to other people*"—Mars-500 study; "*I learned to look at things in a more positive way*"—whole sample and men only in Cruise study; "*I learned to work through problems and not just give up*"—women in Cruise study).

We looked also at the items with highest frequencies of "great deal" answers. Again the items reflecting social growth were the highest ("*I learned to appreciate the strength of others who have had a difficult life*"—Mars-500 study; "*I gained new knowledge about the world*"—Cruise study).

Table 1.
The items with highest and lowest scores in Mars-500 and Cruise studies.

Items with highest scores			
Mars-500 study	**Cruise study (whole sample)**	**Cruise study (women only)**	**Cruise study (men only)**
1. I developed new relationships with helpful others. S	*2. I gained new knowledge about the world.* S	*2. I gained new knowledge about the world.* S	*2. I gained new knowledge about the world.* S
5. I realized I have a lot to offer other people. C/A	*1. I developed new relationships with helpful others.* S	32. I learned to work through problems and not just give up. C/A	11. I learned to look at things in a more positive way. C/A
23. I learned to appreciate t he strength of others who have had a difficult life. S	11. I learned to look at things in a more positive way. C/A	*4. I became more accepting of others.* S	27. I learned to be a more optimistic person. C/A
	4. I became more accepting of others. S	*6. I learned to respect others' feelings and beliefs.* S	
Items with highest frequency of "great deal" answers			
Mars-500 study	**Cruise study (whole sample)**	**Cruise study (women only)**	**Cruise study (men only)**
23. I learned to appreciate the strength of others who have had a difficult life. S	*2. I gained new knowledge about the world.* S	*2. I gained new knowledge about the world.* S	*2. I gained new knowledge about the world.* S
24. I learned not to "freak out" when a bad thing happens. C/A	11. I learned to look at things in a more positive way. C/A	3. I learned that I was stronger than I thought I was. C/A	11. I learned to look at things in a more positive way. C/A
		4. I became more accepting of others. S	27. I learned to be a more optimistic person. C/A
		6. I learned to respect others' feelings and beliefs. S	
Items with highest frequency of "not at all" answers			
Mars-500 study	**Cruise study (whole sample)**	**Cruise study (women only)**	**Cruise study (men only)**
14. I developed/increased my faith in God. R	*19. I developed/increased my trust in God.* R	*22. I understand better how God allows things to happen.* R	31. I learned to take life more seriously. C/A
19. I developed/increased my trust in God. R	*22. I understand better how God allows things to happen.* R	*14. I developed/increased my faith in God.* R	
22. I understand better how God allows things to happen. R	*14. I developed/increased my faith in God.* R	*19. I developed/increased my trust in God.* R	

C/A = cognitive/affective growth (standard font), S = social growth (italics), R = religious growth (italics).

We got a completely different picture when looking at the items with highest frequency of "not at all" answers. Participants of both the studies perceived religious growth as the lowest ("not at all" answers were most frequent in items "*I developed/increased my faith in God*" in both the studies, followed by "*I developed/increased my trust in God*" and/or "*I understand better how God allows things to happen*").

Discussion

According to our results, every respondent reported at least some positive change in the SRGS. Participants of the MARS-500 experiment as well as participants of the Cruise study reported positive changes predominantly in social and cognitive/affective areas. As follows from Table 1, the highest score in both samples was for the item "*I developed new relationships with helpful others*." Naturally, there were differences between the groups and among the participants in the items that grasped personal growth the best. There were also gender differences in the Cruise study sample: both genders were in accordance in highest score in one item only ("*I gained new knowledge about the world*").

However, in both conditions, the least affected was the religious/spirituality area.

In their review of psychological effects of polar expeditions, Palinkas and Suefeld (2008) did not mention spiritual/religious changes among the salutogenic effects of polar expeditions. In the study of Suefeld, Brcic, Johnson and Gushin (2012), retired cosmonauts ($N = 20$) experienced no significant personal growth in spirituality (as measured by Schwartz's Value Survey and Post-Experience Change Inventory).

Similar results in relation to spirituality were reported by Smith, Kinnafick, Cooley, and Sandal (2016), who found among their participants of a mountaineering expedition negligible changes in spiritual matters (as measured by the Post Traumatic Growth Inventory). They suppose that for such a shift to occur in the religious area there would need to be a major event or more profound experience rather than environmental stress caused by expedition endeavors. In their study devoted to the demanding task of a military special unit patrol operating in a polar environment, Kjægaard, Leon, Venables, and Fink (2013) did not find spiritual changes (as measured by the Post Traumatic Growth Inventory) in the follow-up measurement after accomplishing the task. Similarly in another study, Kjærgaard, Leon, and Venables (2015) found in their participant of a prolonged solo sailboat circumnavigation positive changes on all scales of the Post Traumatic Growth Inventory with an exception of Spirituality scale. Similar results, which concerned spirituality, were reported in the study of Ihle, Ritsher, and Kanas (2006) with the participation of astronauts and cosmonauts. The authors explained this result by presumption that those (spiritual and religious) views were already strongly held and there was no room for change. It seems that this explanation holds also for our condition.

According to our opinion, the important point was that the condition, however stressful, had been the personal choice of participants. They were not just thrown into the situation, they decided to go through it. One more point can be added to this, stressed by Ihle, Ritcher, Weiss, and Marmar (2003): "not at all" changes can also suggest that deeply held religious beliefs were even confirmed by stressful experience.

Suefeld et al. (2011) described in their study of astronauts and cosmonauts spiritual changes in minority (guest) groups (in comparison with no changes in the majority/host group). However, this finding did not apply to our study as the cruise sample was the minority group and in the Mars sample no difference between majority (Russians) and minority (non-Russians) participants was detected.

Limitations

The limit of our study is the size of our samples, which is not big enough according to some standards. We were also unable to follow a reintegration process of our participants. There was an important difference between our samples: no selection was made in the Cruise study, whereas the participants of the Mars-500 study represented the "right stuff."

Conclusion

In the last few years, attention has been given not only to the negative impacts of stressful conditions but also to possible positive outcomes. Our study was an explorative study devoted to personal growth in two challenging conditions, in two samples of participants coming from different nations and different cultural backgrounds. The study extends existing knowledge by offering a more intimate insight into the different facets of social and cognitive/affective personal growth. The experience of personal growth was individualized as far as the number of the changes, their intensity, and facets/items in which the changes occurred.

Similarly as in other studies, least affected was the religious/spirituality area. The reason for this is probably that the conditions of our studies, no matter how stressful, were not strong enough to affect such a deeply intimate and strongly held individual process as a belief in God. The substantial point is that, according to our meaning, in both our studies participants underwent no unexpected aversive event, an undertaking of their own choosing.

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