International
Journal of Human Studies
Uluslararası İnsan Çalışmaları Dergisi ISSN: 2636-8641

Cilt/Volume 1 Sayı/Issue 2 Yıl/Year: 2018 Gönderim: 30-09-2018 – Kabul: 20-12-2018

Extreme Altitude Mountain Climbing Decreases Sensation Seeking Score and Increases the Anxiety Level

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Abstract

Background: The aim of the current paper was to compare the anxiety and sensation seeking levels of the mountaineers in the urban environment and at the extremely high altitude.
Material and methods: A total of seven male mountaineers participated in the study

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voluntarily. The participants filled out the Zuckerman's Sensation Seeking Scale-Form V (SSS-V, 1994) and Spielberger's State and Trait Anxiety Inventory (STAI, 1983) for the first time in the urban conditions and for the second time in the last camp at 6400m of the two summits of 7105m and 7134m. The scores of four different sub-scales of the SSS-V, which are boredom susceptibility (BS), disinhibition (D), experience seeking (ES), and thrill and adventure seeking (TAS), were also evaluated.

Results: Results showed a significant difference between trait and state anxiety scores (p= 0.004). Although there were 12.8% of change on general SSS, 22.61% on BS, 13.70% on ES, and 18.43% on TAS scores, these changes were not statistically significant.

Conclusions: Extreme altitude climbing leads to an increase in the anxiety levels of the mountaineers. Furthermore, the SSS-V scores, except the D score, of the mountaineers decreased in the extreme altitudes, but these changes were not statistically significant.

Keywords: *High/Extreme Altitude, Mountain Climbing, State Anxiety, Trait Anxiety, Sensation Seeking*

Introduction

Extreme activities are defined as the activities that could give harm to humans and their environment in the natural world (Demirhan, Asci, Kangalgil & Saracbasi, 2014). Mountaineering, which is evaluated as one of the extreme sports, is also considered causing a high level of risk (Jack & Ronan, 1998; Stranger, 1999; Martha, Sanchez & Goma-Freixanet, 2009; Brymer, 2010; Klinar, Burnik & Kajtna, 2017; Agilonu, Bastug, Mutlu & Pala, 2017) and people participating these kinds of activities are always tend to face the risk (Pereira, 2005). According to well-known cognitive theories regarding

risk-taking; sensitivity to risk, probability estimation and security perception are underpinned of risk-taking (Salameh et al., 2014). Risk takers aspire to enhance their low excitation levels to an optimum level of arousal through risky attitudes, and this probably makes them fearless due to low baseline arousal level (Levenson, 1990). There are some reasons that increase the level of risk at high altitudes. For example, hypoxia affects the human brain and causes neurophysiological functions to be impaired, in parallel with that limited judgment and decision-making capacity which could lead to an increased risk of accidents in dangerous areas (Crust, Swann & Allen-Collinson, 2016; Karinen & Tuomisto, 2017). Besides, some other factors such as rock falls, icefalls and avalanches could also be resulted with fatal injuries or even death.

Nevertheless, perceived risk varies from person to person (Prochniak, 2017). It has been believed that people participating in high-risk sports evaluate the level of risk lower, or they accept the risk as a reward (Jack & Ronan, 1998; Crust et al., 2016; Kerr, 1991; Rossi & Cereatti, 1993). However, there are also some studies in the literature that suggest, those who participate in high-risk sports do not have similar characteristics, and contrary to what is believed, some athletes also want to keep their current situation under their own control (Guszkowska & Bołdak, 2010; Barlow, Woodman & Hardy, 2013).

Sensation seeking has been described by Zuckerman as seeking new, sophisticated, intensive, various emotions and experiences with the desire to take the physical, social, legal and financial risks for these experiences. Sensation seeking can be interpreted with Sensation Seeking Scale (SSS) which was presented by Zuckerman (Zuckerman, 1994). This scale does not have unidimensional structure and has various questionnaires in order to evaluate its factors related to subscales (Lozano et al., 2017). The scale includes boredom susceptibility, disinhibition, experience seeking, and thrill and adventure seeking subscales. Boredom susceptibility refers to discomfort from routines and unchanging situations. Disinhibition means reduced social control. Experience seeking indicates a new and extraordinary way of life and the will to experience emotions and thoughts. Thrill and adventure seeking express the desire to participate in high-level excitement sports and physical activity (Klinar et al., 2017; Rabinowitz and Frauman, 2009). The central nervous system is located in the area of the hypothalamus and reticular formation, and motivated human activities are controlled from this center. Zuckerman's scale also seeks with the subscales to answer these interrelated factors such as the level of excitement, possible excitement, optimal stimulation level, and the boundary between cortical and autonomic stimulation (Burnik, Jug & Kajtna, 2008). The high-level sensation seekers have the chance to improve their self-efficacy by more stimulated situations relatively to low-level sensation seekers (Slanger & Rudestam, 1997). It also has been reported by Cronin (1991) that the level of sensation seeking is greater in people who participate in high-risk sports, especially in mountaineering (Cronin, 1991). Rabinowitz and Frauman (2009) reported that students who participate in a large number of outdoors activities have higher sensation seeking scores (Rabinowitz & Frauman, 2009). Another study showed that rock climbers have a high level of sensation seeking scales when compared to police officers, firefighters and people who receive drug treatment (Levenson, 1990).

It is clearly known that all people are afraid and worried in some situations. It is also important for athletes that their levels of anxiety occurring in the sports environment can be measurable. In

favour of this information, treatment processes and training programs can be prepared (Oner & Le Compte, 1985). In general, anxiety can be handled in two manners, which are state anxiety and trait anxiety (Oner & Le Compte, 1985; Martens, Vealey & Burton, 1990; Van der Bij, De Weerd, Cikot, Steegers & Braspenning, 2003; Lök, Ince & Lök, 2008). These two kinds of anxiety were described for the first time by Cattell and Scheier in 1958 through factor analysis studies and then it has composed the basis of the "Two Factor Anxiety Theory" developed by Spielberger et al. (Oner & Le Compte, 1985). In theory, these two anxiety types are independent of each other and there are items which ascribe the subscales with aspects of behavioral, cognitive, emotional and physiological functions (Buela-Casal & Guillen-Riquelme, 2017). While the state anxiety assesses the stimuli for the threats exist in the environment depending on a situation (measures the anxiety at a given moment), the trait anxiety assesses the predisposition to perception of different stimuli depending on self-experience (measures general anxiety), and it refers to the mood state under pressure (Oner & Le Compte, 1985; Van der Bij et al., 2003; Buela-Casal & Guillen-Riquelme, 2017). It is expected that the state anxiety of the mountaineers will be high in high altitude, as there is always the risk of having injury or death. On the other hand, according to Monasterio, Alamri & Mei-Dan (2014), mountaineers and climbers are more courageous and calmer than the general population, and they suggested that mountaineers could have a low level of trait anxiety (Monasterio, Alamri & Mei-Dan, 2014). In a study, state and trait anxiety levels of nine experienced mountaineers were measured. Contrary to what is expected, the anxiety levels showed a linear increase from the base to the last camp of Mount Everest. It has also been reported that the average trait anxiety scores of the athletes were lower than the general population (Karinen & Tuomisto, 2017). Bolmont, Thullier & Abraini (2000) exposed 8 male mountaineers to a high altitude, increasing gradually from the sea level to 8848m, in a hypobaric condition for 31 days, and observed that the anxiety levels measured by using Spielberger's State-Trait Anxiety Inventory showed a significant increase after 6500 m (Bolmont, Thullier & Abraini, 2000).

It is accepted in the literature that between 1500 m and 3500 m as high altitude, between 3500 m and 5500 m as very high altitude, and above 5500 m as extreme altitude (Pereira, 2005; Curtis, 1995; Medina & Torres, 2017). In the present study, we aimed to evaluate the anxiety and sensation seeking scores of male mountaineers before and during extreme altitude climbing, and demonstrate their aerobic and anaerobic power characteristics.

Method

Participants and study design

A total of seven male advanced mountaineers voluntarily participated in this study. Participants were invited to the laboratory twice. In the first meeting, they were informed about the study design of the research, and they were asked to fill out the informing consent forms. The second meeting took place in the same laboratory for participation in the physical tests. The physical performance tests consisted of body composition, Wingate Anaerobic Power Test (WAnT), Bruce Treadmill Test Protocol, and isokinetic strength tests. The medical reports showing ECG, ECHO, and blood test results of the athletes were received by researchers prior to the study.

Participants were also given two inventories and asked to fill them out in the city and at the last camp of the summit in the mountain. Five of the seven athletes climbed the Peak Korzhenevskaya (7105 m) and two of them the Lenin Peak (7134 m). The inventories given to participants were Spielberger's State and Trait Anxiety Inventory and Zuckerman's Sensation Seeking Scale.

Measurements

Collection of Inventories

Psychological measures for the study were State and Trait Anxiety Inventory (STAI) and Sensation Seeking Scale-Form V (SSS-V). Participants were instructed how to respond to the inventories. The SSS-V was given to participants twice. The participants completed the inventory first in the city environment, and then by 20 minutes before departing the last camp of the summit at 6400 m. The SSS-V is a scale, developed by Zuckerman (1994), consists of 40 items with two answers (Zuckerman, 1994). The original version of the inventory contains 4 different subscales, and each subscale includes 10 items. These subscales are; Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Disinhibition (D), and Boredom Susceptibility (BS). The Turkish version of the inventory has 33 expressions. The TAS consist of 9, the D 9, the ES 7 items, and the BS includes 8 items (Beyaz, 2004).

The second inventory was Spielberger's State and Trait Anxiety Inventory (STAI) developed by Spielberger et al. (1983) (Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983). The STAI is a 40-item inventory and two subscales, state anxiety and trait anxiety. Each subscale includes 20 items, with each item being scored on a Likert scale of 1-4.

Body composition

Body weight (BW), percent body fat (PBF), and body mass index (BMI) were measured with Avis 333 plus (Korea) analyser in impedance range set between 5 and 250 k/Hz, using 8 electrodes, and Holtain branded stadiometer with 1-mm distance was used to measure heights (Holtain, U.K.). The mean age (years), body height (cm), body weight (kg), percent body fat, and body mass index were used to define the demographic characteristics of the participants.

Resting heart rate and VO_2max

Resting HRs (RestHRs) were monitored and recorded with a Polar Team 2 (Polar, Finland) brand device after lying 10 minutes for each participant. Bruce Treadmill Test Protocol was used for the determination of aerobic power. VO_2max measurement was made by a Viasys-Oxycon branded MasterScreen-CPX spirometer (Hoechberg, Germany) and RAM branded 770 M treadmill (CAMIN, Italy). Before each measurement, heat, humidity, air volume and gas calibrations of the devices were made. Bruce protocol was started with a 10% incline and 2.72 km/h, the incline was increased by 2 % and the speed was increased by 1.28-1.44 in every three minutes. The test continued this way until the participant could not continue anymore. VO_2max values obtained at the last minute of the test were accepted as the real VO_2max values of the participants and maximal HRs (MaxHRs) values were taken

as average HR. VO_2max (ml/kg/min), MaxHRs (pulse/min), and test duration (min) parameters were evaluated to determine the cardiovascular endurance.

Anaerobic power

The Wingate Anaerobic Power Test (WAnT) was conducted by using a cycle ergometer (Ergomedic 894 E Peak Bike, Monark, SWEDEN) according to the procedures suggested by Inbar, Bar-Or & Skinner (1996) (Inbar, Bar-Or & Skinner, 1996). According to this, athletes warmed up for 4 minutes at between 60-80 rpm with two 3-second loads at 1.30 and 2.30 minutes and had another 4 minutes for resting period. Subsequently, the athletes were encouraged verbally to show their maximal limits during the WAnT protocol. The parameters derived from the software were relative peak power (RPP), relative average power (RAP), relative minimum power (RMP), and power drop (PD).

Statistical analysis

SPSS 20 package program (SPSS Inc., Chicago, IL, USA) was used for the statistical data analyses in the present study. The Shapiro-Wilk test was utilized to determine the normality of the data. Paired Sample *t*-Test or Wilcoxon Test was used for comparisons between the pre and post-test scores of sensation seeking inventory and state and trait anxiety scores. Spearman correlation was chosen to evaluate the relationship between psychological and physiological parameters. An alpha value of 0.05 was accepted for all of the statistical analyses.

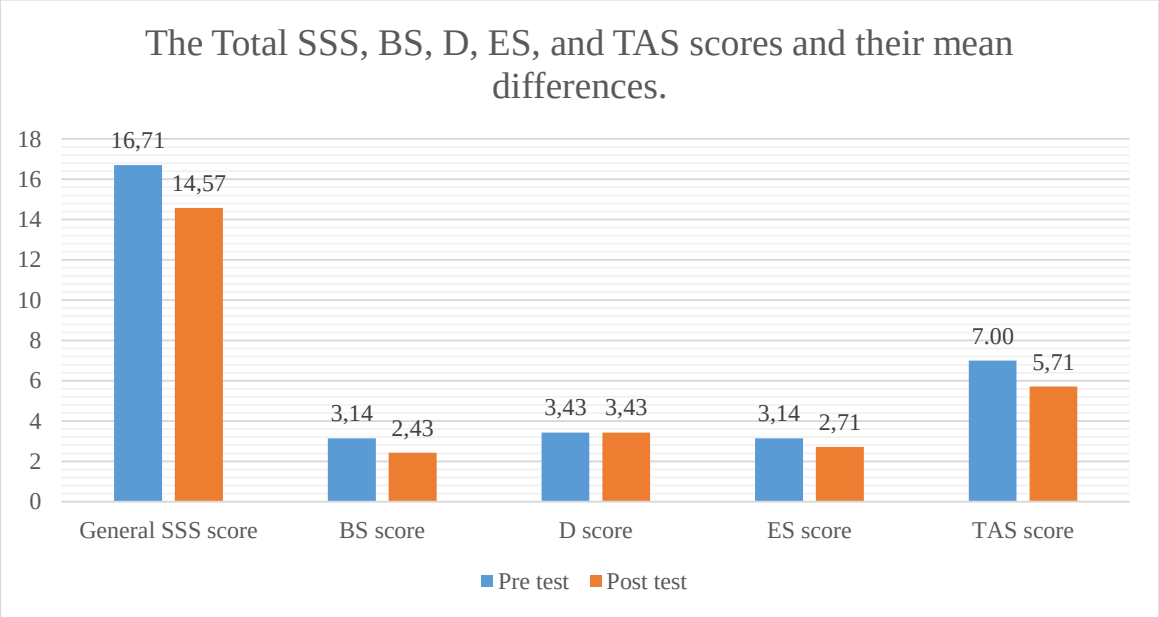
Results

The demographic characteristics of the participants are shown in Table 1.

Table 1. The demographic characteristics of the participants.

Mean age (years)	Body height (cm)	Body weight (kg)	Percent body fat (PBF)	Body mass index (BMI)
40.14 ± 9.51	176.42 ± 6.75	74.27 ± 10.99	19.10 ± 5.34	23.80 ± 2.79

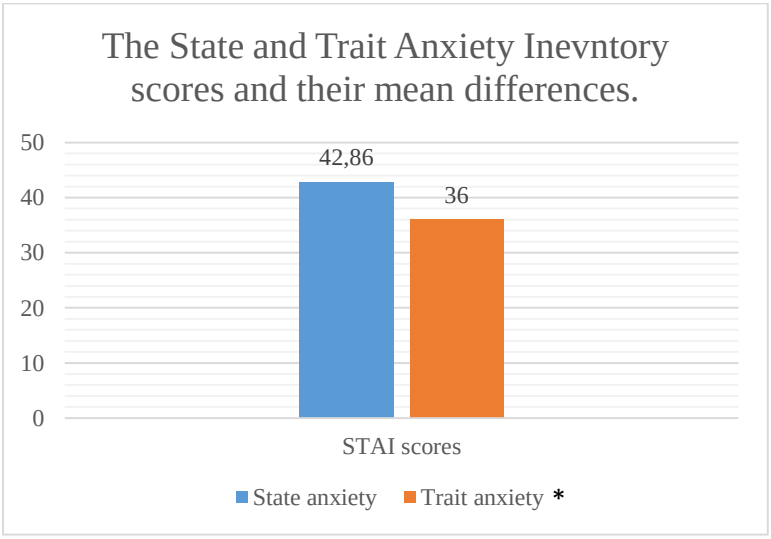
The general score of the Sensation Seeking Scale (SSS) and the average scores of its four subscales [boredom susceptibility (BS), disinhibition (D), experience seeking (ES), thrill and adventure seeking (TAS)] are shown in Figure 1. According to the results, the General SSS, BS, D, ES and TAS scores were 16.71 ± 3.55, 3.14 ± 1.46, 3.43 ± 0.79, 3.14 ± 1.57, 7.00 ± 0.82 in the city environment and 14.57 ± 3.74, 2.43 ± 1.40, 3.43 ± 1.27, 2.71 ± 1.50, and 5.71 ± 1.89 at the last camp of the summit, respectively. No significant change was found in any of the SSS scores.



SS: sensation seeking, BS: boredom susceptibility, D: disinhibition, ES: experience seeking, TAS: thrill and adventure seeking.

Figure 1. The general SSS, boredom susceptibility, disinhibition, experience seeking, and thrill and adventure seeking scores and their mean differences.

Findings showed a significant difference in the anxiety scores of athletes. The trait anxiety score was 36.00 ± 3.79, and the state anxiety score was 42.86 ± 5.46 (p= 0.01).



* p< 0.01

Figure 2. The State and Trait Anxiety Inventory scores and their mean differences.

The results of WAnT and Bruce Treadmill Test Protocol are shown in Table 2.

Table 2. The Wingate anaerobic test protocol and Bruce treadmill test protocol results of the mountaineers.

Bruce Treadmill Test Protocol

RestHRs (pulse/min)	MaxHRs (pulse/min)	VO_2max (ml.kg^{-1}.min^{-1})	Total time (min)
69.86 ± 7.06	189.59 ± 11.59	59.30 ± 6.33	20.87 ± 1.52

Wingate Anaerobic Test Protocol

PP/BW (watt/kg)	AP/BW (watt/kg)	MP/BW (watt/kg)	Power drop (%)
9.93 ± 1.75	7.20 ± 0.91	4.95 ± 0.54	49.44 ± 5.70

According to the correlation analyses, there was no significant relationship found between psychological parameters and the parameters obtained from Bruce Treadmill Test Protocol and Wingate Anaerobic Power Test.

Discussion

The purpose of the current study is to show some physiological parameters of the mountaineers and compare their anxiety and sensation seeking scores before and during extreme altitude climbing. We hypothesized that mountaineers would have high levels of anxiety scores, and lower level of sensation seeking scale scores during the climbing to Peak Korzhenevskaya (7105 m) and Lenin Peak (7134 m).

Fitness level, specifically aerobic capacity, is one of the main components of a successful ascent (Burtscher, 2004). Since physiological capacity can also affect the psychological condition, measuring the physiological capacities of the athletes is an initial step in the present study. When the physiological results are examined, it can be seen that the athletes have high levels of VO_2max (Ehrman et al., 2010). There are some studies examined the aerobic capacity of athletes. Arazi, Saeedi & Izadi (2017) reported the VO_2max 44.25 ± 7.37 of 38 elite male mountain climbers (Arazi et al., 2017). Billat et al. (2010) measured the VO_2max 54.1 ± 2.8 of 8 experienced mountain climbers (Billat et al., 2010). The VO_2max of 32 experienced mountaineers was found 50.7 ± 9.5 by Latshang et al., (2013) (Latshang et al., 2013). Karinen and Tuomisto (2017) reported the VO_2max of male experienced mountain climbers as 56.4 ± 6.3 of 9 (Karinen & Tuomisto, 2017). According to Burtscher, Gatterer and Domej (2009) a VO_2max level should be about 49 ml.kg^{-1}.min^{-1} to climb 5000 m, and above 60 ml.kg^{-1}.min^{-1} to climb 8000 m (Burtscher, Gatterer & Domej, 2009). Therefore, the aerobic capacity of the athletes in the present study can be considered well. Zarzeczny, Podleśny and Polak (2013) found the WAnT peak power of the 8 male amateur mountain bikers as 11.75 ± 0.19, and mean power as 9.11 ± 0.16 (Zarzeczny, Podleśny & Polak, 2013). Yarım and Günay (2010) reported the WAnT peak power value as 11.2 ± 1.5, and mean power 8.4 ± 0.5 of 10 male cross-country skiers (Yarım & Günay, 2010). Five elite marathon runners produced 10.0 ± 1.0 peak power, and 8.2 ± 0.7 mean power level through the Wingate test (Legaz-Arrese, Munguía-Izquierdo, Carranza-García & Torres-Dávila, 2011). Although the WAnT results of the athletes in the present study seem lower than some other athletes' results, these findings could be considered adequate due to the slow progressive nature of the high-altitude mountaineering. Besides these findings, no correlation was found between physiological and psychological parameters.

In accordance with the results, there was a significant increase in the anxiety level (p= 0.004). The anxiety level evaluated by using Spielberger's State-Trait Anxiety Inventory changed from 42.86 ± 5.46 in the city environment to 36.00 ± 3.79 at the last camp of the summit at 6400 m (16%). Being at extreme altitude, having the risk of fatal injury or death, and decreased partial oxygen pressure could have caused the increased trait anxiety score. There are a few researches about the anxiety level at high altitudes in the literature. Nelson (1982) reported an increase in the anxiety levels of 20 participants during the 35-day mountain climbing from sea level to 5000 m (Nelson, 1982). In another study, in which the anxiety level measured through STAI, Bolmont et al. (2001) kept 8 male mountaineers in a hypobaric chamber from the sea level to 8848 m for 31 days and reported that the state anxiety score increased after 6500 m (Bolmont, Bouquet & Thullier, 2001). Xu et al. (2014) reported that the exposure to high altitude decreases cognitive flexibility and increases anxiety (Xu et al., 2014). On the other hand, Karinen and Tuomisto (2017) evaluated the State-Trait Anxiety levels of nine experienced mountaineers during their climb to Mount Everest (Karinen & Tuomisto, 2017). The climb took the athletes 69 days, and they filled out the STAI once at baseline, four times at 5300 m at Everest Base Camp, and last time at the baseline altitude again. At the end of the study, researchers reached the highest level of both state and trait anxiety levels at the baseline (29.33 ± 4.61, 25.89 ± 4.20 respectively). As seen above, the changes in the anxiety levels are not clear in the literature. According to Roth et al. (2002) some other reasons such as the time passed at high altitude, the negative effect of being in a chamber for a month, and acute mountain sickness could have also affected the level of anxiety (Roth et al., 2002).

Taking risks is a way to increase physiological state, and to experience satisfactory feelings (Zuckerman, 1994). Therefore, athletes participating in high-risk sports such as high or extreme altitude climbing tend to have higher levels of sensation seeking scores than the general population (Jack & Ronan, 1998; Crust et al., 2016; Kerr, 1991; Cronin, 1991). Alpinists, extreme kayakers, and skydivers are reported with higher scores in TAS and ES subscales by Breivik (1999) (Breivik, 1999). Guszkowska and Bołdak (2010) found significantly higher General SSS, TAS, ES, D, and BS scores in 217 high-risk sports participants than nonparticipants (Guszkowska & Bołdak, 2010).

In the current study, the sensation seeking scores were obtained from Zuckerman's SSS-V inventory. The general SSS scores were 16.71 ± 3.55 in the urban environment and 14.57 ± 3.74 at the extreme altitude at 6400 m (12.8 % change). The changes in the four subscales were; 22.61 % for Boredom Susceptibility (from 3.14 ± 1.46 to 2.43 ± 1.40), 0 % for Disinhibition (from 3.43 ± 0.79 to 3.43 ± 1.27), 13.70 % for Experience Seeking (from 3.14 ± 1.57 to 2.71 ± 1.50), and 18.43 % for Thrill and Adventure Seeking (from 7.00 ± 0.82 to 5.71 ± 1.89). TAS has been defined as the desire for participation in unusual physical activities (Klinar et al., 2017) and people taking a part in high-risk sports tend to have a high level of TAS scores. As expected, the TAS scores of the athletes were higher than their ES, BS, and D scores in the urban condition. Nonetheless, athletes' TAS scores showed 18.43 % reduction based on extreme altitude. Doing both physiological and psychological exhausted activity at the extreme altitude also decreased ES, BS, and D scores of the athletes. It indicates that extreme altitude represses seeking unusual mental or sensual experiences (ES), feeling discomfort from routines and unchanging situations as well. The only subscale which did not change was D. D refers

to reduced social control, and mainly related to social activities and sex. Since the Turkish version of the SSS-V consists of only 33 expressions, it was, unfortunately, insufficient to compare the results parallel with the literature. Even so, knowing the results of similar studies could give a chance to evaluate the findings in the current paper. Castanier, Scanff and Woodman (2010) stated that 265 high-risk sports participants (mountaineering, rock climbing, paragliding, skydiving, and downhill skiing) had 24.77 general SSS-V score (Castanier, Scanff & Woodman, 2010). Zarevski, Marušić, Zolotić, Bunjevac and Vukosav (1998) compared the sensation seeking scores of male high-risk sports (alpinism, parachuting, gliding, scuba diving, and speleology) and low-risk sport participants (table tennis, bowling, and rowing), and found the general SSS score 22.62 for high-risk and 18.64 for low-risk athletes (Zarevski, Marušić, Zolotić, Bunjevac & Vukosav, 1998). The sensation seeking scores of the 76 high-risk sport athletes (alpinism, skydiving, diving, and downhill skiing) measured for general SSS score 24.84, for TAS 7.83, for ES 6.32, for D 6.82, and for BS 3.88 through Zuckerman's SSS-V by Klinar et al. (2017) (Klinar et al., 2017). Jack & Ronan (1998) reported the General SSS score 23.03, the TAS 7.41, the ES 5.90, the D 5.60, and the BS 4.14 in 93 high-risk sports athletes (Jack & Ronan, 1998). Furthermore, their scores were significantly higher than people who participate in low-risk sports.

As our knowledge, this is the first study to observe the change in sensation seeking scores during an extreme altitude climbing in the same participants. As seen above, previous studies conducted on sensation seeking level in high-risk sports did not examine the level of change during the activities. Although the changes observed in the present study were not statistically significant, it could be inferred that extreme altitude climbing is concluded with decreased sensation seeking score during extreme altitude climbing. The same reasons which increase the anxiety level such as hypoxia, the risk of fatal injury or death could also be efficient in the decrease in sensation seeking scores. Moreover, mountaineers have been demonstrated by Ewert (1994) have a high level of control (Ewert, 1994). Hence, the decreased sensation seeking scores could be the result of tending to control every situation.

The sensation seeking scores could be affected by some other factors such as hormonal changes (Guszkowska & Bołdak, 2010; Özdemir, 2007), and genetic variants (Guszkowska & Bołdak, 2010; Thomson et al., 2015). Gender could also be another substantial factor in sensation seeking. Among 101 extreme-sport athletes, males were reported with higher sensation seeking score than females (Agilonu et al., 2017). Jack & Ronan (1998) also found General SSS, TAS, and D scores significantly higher on males (Jack & Ronan, 1998). On the other hand, Burnik et al. (2008) reported that the ES score was only higher in males, and the D score was higher in females (Burnik et al., 2008).

In conclusion; it was observed that extreme altitude mountain climbing affects the anxiety and the sensation seeking levels of the athletes. However, to gain more comprehensible results about the changes in anxiety, the time effect should be controlled, other reasons effective on anxiety should be measured, and negative effects of artificial conditions such as chambers should be eliminated. Furthermore, the sensation seeking could be affected by some hormonal changes, genetic factors, and gender as well. Hence, future studies could also measure the changes on hormonal levels that depend on altitude and genetic structure, and consider the genders of athletes.

REFERENCES

Agilonu, A., Bastug, G., Mutlu, T. O., Pala, A. (2017 Jan). Examining risk-taking behavior and sensation seeking requirement in extreme athletes. *Journal of Education and Learning, 6*(1):330. Doi:10.5539/jel.v6n1p330

Arazi, H., Saedi, T., Izadi, M. (2017). Association of anthropometric, physiologycal and physical traits to success of elite male mountain climbers. *Fizička kultura, 71*(1):12-20.

Barlow, M., Woodman, T., Hardy, L. (2013 Sep). Great expectations: Different high-risk activities satisfy different motives. *Journal of Personality and Social Psychology, 105*(3):458. Doi:10.1037/a0033542

Beyaz, Ş. (2004). *Heyecan arama gereksinimi ve akran baskısının ergenlerin risk alma eğilimleri ile ilişkisi.[The relationship of need for sensation seeking and peer pressure with adolescents tendency for risk taking]*. (Unpublished master's thesis). Ankara Üniversitesi, Ankara, Türkiye.

Billat, V. L., Dupré, M., Karp, J. R., Koralsztein, J. P. (2010 Apr). Mountaineering experience decreases the net oxygen cost of climbing Mont Blanc (4,808 m). *European Journal of Applied Physiology, 108*(6):1209-16.

Bolmont, B., Bouquet, C., Thullier, F. (2001). Relationship of personality traits with performance in RT, psychomotor ability, and mental efficiency during a 31-day simulated climb of Mount Everest in a hypobaric chamber. *Percept Mot Skills, 92*(3 Pt 2).

Bolmont, B., Thullier, F., Abraini, J. H. (2000 Dec). Relationships between mood states and performances in reaction time, psychomotor ability, and mental efficiency during a 31-day gradual decompression in a hypobaric chamber from sea level to 8848 m equivalent altitude. *Physiology & Behaviour, 71*(5):469-76.

Breivik, G. (1999). Sensation seeking in sport. Oslo, Norway: Norwegian School of Sport Sciences.

Brymer, E. (2010 Jan). Risk taking in extreme sports: A phenomenological perspective. *Annals of Leisure Research, 13*(1-2):218-38. Doi:10.1080/11745398.2010.9686845

Buela-Casal, G., Guillén-Riquelme, A. (2017 Sep). Short form of the Spanish adaptation of the State-Trait Anxiety Inventory. *International Journal of Clinical and Health Psychology, 17*(3):261-8. Doi:10.1016/j.ijchp.2017.07.003

Burnik, S., Jug, S., Kajtna, T. (2008 Sep). Sensation seeking in Slovenian female and male mountain climbers. *Acta Universitatis Palackianae Olomucensis, Gymnica*, *1*;38(3).

Burtscher, M. (2004 Oct). Exercise capacity for mountaineering: how much is necessary? *Research in Sports Medicine, 12*(4):241-50.

Burtscher, M., Gatterer, H., Domej, W. (2009 Mar). Physiological basis to climb Mt. Everest in one day. *Respiratory Physiology & Neurobiology, 166*(1):3.

Castanier, C., Scanff, C. L., Woodman, T. (2010 Oct). Beyond sensation seeking: Affect regulation as a framework for predicting risk-taking behaviors in high-risk sport. *Journal of Sport And Exercise Psychology, 32*(5):731-8.

Cronin, C. (1991 Jan). Sensation seeking among mountain climbers. *Personality and Individual Differences, 12*(6):653-4.

Crust, L., Swann, C., Allen-Collinson, J. (2016 Dec). The thin line: A phenomenological study of mental toughness and decision making in elite high-altitude mountaineers. *Journal of Sport and Exercise Psychology, 38*(6):598-611. Doi:10.1123/jsep.2016-0109

Curtis, R. (1995). Outdoor action guide to high altitude: Acclimatization and illnesses. Princeton NJ, Outdoor Action Program.

Demirhan, G., Asci F. H., Kangalgil, M., Saracbasi, O. (2014). Perception of risk and attractiveness

of extreme sports among Turkish University students. *Hacettepe Journal of Sport Science*s, *25*(1):11-22.

Ehrman, J. K., Dejong, A., Sanderson, B., Swain, D., Swank, A., Womack, C. (2010). *ACSM'S resource manual for guidelines for exercise testing and prescription* (6th ed.). Baltimore MD: Wolters Kluver - Lippincott Williams & Wilkins.

Ewert, A. W. (1994 Jan). Playing the edge: Motivation and risk taking in a high-altitude wilderness like environment. *Environment and Behavior, 26*(1):3-24.

Guszkowska, M., Bołdak, A. (2010 Sep). Sensation seeking in males involved in recreational high risk sports. *Biology of Sport, 27*(3):157-162.

Inbar, O., Bar-Or, O., Skinner, J. S. (1996). *The Wingate anaerobic test*. Champaign, IL, Human Kinetics.

Jack, S. J., Ronan K. R. (1998, Dec). Sensation seeking among high-and low-risk sports participants. *Personality and Individual Differences*, *25*(6):1063-83.

Karinen, H. M., Tuomisto, M. T. (2017 Sep). Performance, mood, and anxiety during a climb of Mount Everest. *High Altitude Medicine & Biology*. Doi:10.1089/ham.2017.0033.

Kerr, J. H. (1991 Jan). Arousal-seeking in risk sport participants. *Personality and Individual Differences, 12*(6):613-6.

Klinar, P., Burnik, S., Kajtna, T. (2017 Mar). Personality and sensation seeking in high-risk sports. *Acta Gymnica, 47*(1):41-8. Doi:10.5507/ag.2017.005

Latshang, T. D., Turk, A. J., Hess, T., Schoch, O. D., Bosch, M. M., Barthelmes, D., Merz, T. M., Hefti, U., Pichler Hefti J., Maggiorini M., Bloch K. E. (2013 Aug). Acclimatization improves submaximal exercise economy at 5533 m. *Scandinavian journal of medicine & science in sports, 23*(4):458-67.

Legaz-Arrese, A., Munguía-Izquierdo, D., Carranza-García, L. E., Torres-Dávila, C. G. (2011 Mar). Validity of the Wingate anaerobic test for the evaluation of elite runners. *The Journal of Strength & Conditioning Research, 25*(3):819-24.

Levenson, M. R. (1990 Jun). Risk taking and personality. *Journal of Personality and Social Psychology, 58*(6):1073.

Lök S, İnce A, Lök N. Beden Eğitimi Spor Yüksekokulu Özel Yetenek Sınavına Girecek Adayların Kaygı Durumlarının Bazı Değişkenler Açısından İncelenmesi. Niğde Üniversitesi, Beden Eğitimi ve Spor Bilimleri Dergisi, Niğde. 2008;2(2).

Lozano, L. M., Megías, A., Catena, A., Perales, J. C., Baltruschat, S., Cándido, A. (2017). Spanish validation of the Domain-Specific Risk-Taking (DOSPERT-30) Scale. *Psicothema, 29*(1). Doi:10.7334/psicothema2016.132

Martens, R., Vealey, R. S., Burton, D. (1990). Competitive anxiety in sport. *Human kinetic*s.

Martha, C., Sanchez, X., Gomà-i-Freixanet, M. (2009 Jan). Risk perception as a function of risk exposure amongst rock climbers. Psychology of Sport and Exercise, *10*(1):193-200.

Medina, J. A., Torres, P. A. (2017). Efectos de la hipoxia en montañeros expuestos a altitudes extremas/Effects of hypoxia on mountaineers exposed to extreme altitudes. *Apunts. Educació Física i Esports, 1*(127):44.

Monasterio, E., Alamri, Y. A., Mei-Dan, O. (2014 Jun). Personality characteristics in a population of mountain climbers. *Wilderness & Environmental Medicine, 25*(2):214-9. Doi:10.1016/j.wem.2013.12.028

Nelson, M. (1982 Feb). Psychological testing at high altitudes. *Aviation Space and Environmental Medicine, 53*(2):122-126.

Oner, N., Le Compte, A. (1985). *Durumluk-Surekli kaygi envanteri el kitabi*. Istanbul: Boğaziçi Yayinları.

Özdemir, E. (2007). *Antisosyal kişilik bozukluğunda heyecan arama davranışı ile serum seks steroidleri düzeyleri arasındaki ilişkinin incelenmesi.[Investigation of the relationship between the excitement seeking behavior and serum sex steroid levels in antisocial personality disorder]* (Thesis in Medicine), Gülhane Askeri Tıp Akademisi, Askeri Tıp Fakültesi, Ankara, Turkey.

Pereira, A. L. (2005 Jan). The experience of risk in high-altitude climbing. *World Leisure Journal*, *47*(2):38-49. Doi:10.1080/04419057.2005.9674394

Prochniak, P. (2017). Wilderness Courage Scale (WCS). *Journal of Human Performance in Extreme Environments, 13*(1):2. Doi:10.7771/2327-2937.1086

Rabinowitz, E., Frauman, E. D. (2009 Oct). A preliminary investigation of sensation-seeking and risk-based recreation among college students: Implications for intramural and outdoor programs. *Recreational Sports Journal, 33*(2):109-18.

Rossi, B., Cereatti, L. (1993 Oct). The sensation seeking in mountain athletes as assessed by Zuckerman's Sensation Seeking Scale. *International Journal of sport psychology, 24*(4):417-431.

Roth, W. T., Gomolla, A., Meuret, A. E., Alpers, G. W., Handke, E. M., Wilhelm, F. H. (2002 Jan). High altitudes, anxiety, and panic attacks: is there a relationship? *Depression and Anxiety, 16*(2):51-8.

Salameh, P., Salamé, J., Waked, M., Barbour, B., Zeidan, N., Baldi, I. (2014 Jul). Risk perception, motives and behaviours in university students. *International Journal of Adolescence and Youth*, *19*(3):279-92. Doi:10.1080/02673843.2014.919599

Slanger, E., Rudestam, K. E. (1997 Sep). Motivation and disinhibition in high risk sports: Sensation seeking and self-efficacy. *Journal of Research in Personality, 31*(3):355-74.

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P., Jacobs, G. (1983). Manual for the state-trait anxiety inventory (Palo Alto, CA, Consulting Psychologists Press). Inc.

Stranger, M. (1999 Sep). The aesthetics of risk: A study of surfing. *International Review for the Sociology of Sport*, *34*(3):265-76.

Thomson, C. J., Power, R. J., Carlson, S.R., Rupert, J.L., Michel, G. (2015 Nov). A comparison of genetic variants between proficient low-and high-risk sport participants. *Journal of Sports Sciences, 33*(18):1861-70. Doi:10.1080/02640414.2015.1020841.

Van der Bij, A. K., De Weerd, S., Cikot, R. J., Steegers, E.A., Braspenning, J.C. (2003). Validation of the Dutch short form of the state scale of the Spielberger State-Trait Anxiety Inventory: considerations for usage in screening outcomes. *Public Health Genomics, 6*(2):84-7.

Xu, L., Wu, Y., Zhao, T., Liu, S. H., Zhu, L. L., Fan, M., Wu, K. W. (2014 Mar). Effect of high altitude hypoxia on cognitive flexibility. *Chinese Journal of Applied Physiology, 30*(2):106-9.

Yarım, I., Günay, M. (2010). Investigation of relationship between different distance roller skiing performance and anaerobic power in cross country skiers. *Gazi Beden Eğitimi ve Spor Bilimleri Dergisi, 15*(4):15-22.

Zarevski, P., Marušić, I., Zolotić, S., Bunjevac, T., Vukosav, Ž. (1998 Oct). Contribution of Arnett's inventory of sensation seeking and Zuckerman's sensation seeking scale to the differentiation of athletes engaged in high and low risk sports. *Personality and Individual Differences, 25*(4):763-8.

Zarzeczny, R., Podleśny, M., Polak, A. (2013 Sep). Anaerobic capacity of amateur mountain bikers during the first half of the competition season. *Biology of Sport, 30*(3):189. Doi:10.5604/20831862.1059210

Zuckerman, M. (1994 Jun). Behavioral expressions and biosocial bases of sensation seeking. *Cambridge University Press, 24*.