

Psychological Characteristics of Free Diving Athletes: A Comparative Study

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Abstract

This study aimed to investigate the situational and stable psychological characteristics of free diving athletes. Specifically, stress level, state and trait anxiety, positive and negative affectivity, ways of coping with stress and locus of control among the free diving athletes were studied. 36 were free diving athletes and 41 non-athletes participated in the study. The situational and stable psychological characteristics which influence sport expertise were simultaneously included as dependent variables. Results showed that the scores of the free diving athletes on the state anxiety, stress level and negative affect were significantly lower than that of non-athletes. In addition, the free diving athletes obtained significantly higher scores on internal locus of control and self confident coping style. These results indicated that the free diving sport has positive effects on both situational and stable psychological characteristics.

Keywords: Free diving athletes, stress, anxiety, affectivity, ways of coping, locus of control

1 Introduction

Free diving is a sport in which an individual dives by holding his/her breathe in water. In Turkey, free diving can be regarded as a new sport and sport clubs that have this branch work under the supervision of Turkish Underwater Sports Federation. The main characteristic of the free diving which differentiates it from other sports is; in free diving, the performance of the athletes under water is related with their own physiological and psychological limits. In addition, the athletes are not in direct contact with their rivals. In other words, the free diving athletes rely on their *self* while doing this sport and therefore, acknowledgement of the psychological characteristics of the free divers will enable us to determine the possible contributions of this sport to psychological well-being.

Large body of research had examined the relationship between sports and psychological factors. Many studies compare athletes with non-athletes in terms of psychological well-being. Low levels of stress and anxiety, positive affectivity, less somatic and depressive symptoms, high levels of self-confidence and effective coping strategies were the commonly examined psychological variables that predict the psychological well-being (for example, Malebo, van Eeden, & Wissing, 2007; Ntoumanis & Biddle, 1998; Rimmele et al., 2007; Robazza & Bortoli, 2003; Shirka, 2000).

Although there are several studies in sports psychology which examine the psychological characteristics of athletes in many different sports, the literature search did not yield any such study, where the psychological characteristics free diving athletes were examined. Few studies on the free diving sport in the literature have mostly examined the physiological effect of apnea, relations between heart rate and apnea duration, and apnea duration and time estimation (Jamin, Joulia, Fontanari, Bonnon et al., 2004; Jamin, Joulia, Fontanari, Giacomoni et al., 2004; Joulia, Steinberg, Wolff, Gavarry, & Jammes, 2002; Sterba & Lundgren, 1988).

To our knowledge, there is no empirical research which investigates the psychological characteristics of specific athlete groups by considering both situational and stable psychological characteristics together. The factors that shape characteristics of free diving athletes can be grouped as primary and secondary factors (Baker & Horton, 2004). As Baker and Horton (2004) defined the psychological, genetic and training/practice factors can be regarded as primary factors; sociocultural and contextual factors on the other hand can be called as secondary factors. The psychological factors can be grouped around two dimensions: the situational psychological and the stable psychological factors.

The situational psychological factors may vary from situation to situation, i.e. change momentarily such as anxiety and concentration levels. The stable psychological factors on the other hand, do not change easily and are somehow stable over time and across situations such as the self-confidence and motivation level. In our study, we examined the situational and stable psychological factors proposed by Baker and Horton (2004) together with the aim of determining the psychological profiles of the free diving athletes considering several dimensions.

In this research, the stress level, state and trait anxiety and positive and negative affectivity were included as the situational psychological factors and the ways of coping with stress and locus of control were included as the stable psychological factors. In the following section, the studies that examine the previously mentioned factors among the athletes and non-athletes were reviewed.

1.1 Situational Factors: Stress level, State-Trait Anxiety and Positive- Negative Affectivity

Stress is one of the most widely studied topics in sports literature. The studies on the stress mostly examine the effect of exercise or sport in reducing stress and coping with it. Among them, Wijndaele and colleagues (2007) investigated the stress and social support levels of 2616 adults and they found that people who do not do any sports experienced higher levels of stress and had lower levels of social support as compared to those who do a sport.

In addition, it was revealed that people who do sport had higher self-efficacy and self-confidence, experienced less threat using these abilities in stressful situations, and they were more successful at coping with stress. Another study conducted among university students revealed similar findings, that is, the students who do sport experienced lower levels of stress and had fewer psychological symptoms as compared to those who do not do sport (Shirka, 2000). Rimmele and colleagues (2007) conducted an experimental study to investigate people's reactions to psychosocial stress resources. The experimental group consisted of 22 high-level athletes and the control group consisted of 22 non-athletes. The results showed that the physical and psychological stress reactions of the athletes were lower than that of non-athletes. Under an experimentally created stressful condition, the athletes showed lower levels of anxiety and more positive affectivity. The athletes and non-athletes also differ on their levels of state and trait anxiety. Studies mostly show that the athletes have lower anxiety levels. In their study among 374 professional and amateur athletes doing individual (biathlon, swimming, skiing, tennis and canoeing) or group (football, basketball and volleyball) sports, Robazza and Bortoli (2003) found that the professional athletes had lower anxiety levels, more adaptive and performance facilitative positive affectivity and self-confidence than the amateur athletes.

In another study (Aşçı, 2003), 20 female university students who attended aerobic and step dance classes regularly during ten weeks were compared with 20 female university students who did not attend to any physical activity programs regularly. Participants completed State-Trait Anxiety Inventory (STAI I-II) and Physical Self-Description Questionnaire (PSDQ) at the beginning, in the middle and at the end of the study. As a result, it was found that the trait anxiety levels of participants who attended to the ten weeks-physical activity program decreased and they perceived themselves physically more positive.

In their study conducted with 277 athletes and 152 non-athletes, Han and colleagues (2006) found that the athletes had lower levels of state and trait anxiety as compared to the non-athletes. Studies on affectivity have shown more positive affectivity among the athletes than the non-athletes. For example Malebo, van Eeden, & Wissing (2007) revealed that the athletes experienced less negative affectivity, somatic complaints and pessimist thoughts. Furthermore, they found that doing sport was related to more positive affectivity, competency, autonomy and self determination.

1.2 Stable Psychological Factors: Ways of Coping with Stress and Locus of Control

The ways of coping with stress have been associated with many factors such as sport performance and affectivity in the extant literature. It is important to differentiate the coping strategies used during the stressful situations such as sports competition from coping styles (Lazarus, 1993) that are relatively stable across situations. Gaudreau and Blondin (2004) had emphasized the importance of investigating the coping styles that the athletes use to cope with the stress in general rather than the coping strategies used in the specific stressful situations. Wolfson and Neave (2007) examined the ways of coping among football players, and found that the athletes who used seeking social support and positive reappraisal were more successful.

Ntoumanis and Biddle (1998) examined the relation between the coping and the affectivity among 356 British university students. In their study, the problem focused coping was associated with the positive affectivity while the emotion focused coping was associated with the negative affectivity. Allen, Greenlees and Jones (2011) investigated the relation between the personality characteristics and the coping ways among athletes doing different sports, and revealed that extraverts used more problem focused coping strategy.

The last stable psychological factor examined in this study was locus of control. This construct has been proposed based on the social learning model and considered as one of the main personality characteristics (Rotter, 1966). Conceptually, the internal locus of control is one's belief in his/her own control of reinforces that influence the behavior; and the external locus of control is one's belief in control of the external factors or events (Rotter, 1966; Dağ, 2002). There are various studies that relate the internal locus of control to more positive affectivity, less psychological problems and effective coping with stress (e.g. Dağ, 1992; Gomez, 1998; Hale & Cochran, 1987).

The locus of control is also associated with the psychological and physical well-being. Individuals who value the physical fitness and have internal locus of control showed better performance in controlled testing conditions. In a related vein, the athletes with high internal motivation used more effective coping strategies and put more effort in the sport competitions (Mouratidis & Michou, 2011). Previous studies have shown that the people doing individual sports have more internal locus of control. For instance, researchers found that the elite swimmers and the runners had higher internal locus of control scores (Burke & Straub, 1977; Burke, Straub, & Bonney, 1975).

Todd and Brown (2003) examined the relations between acceptance of athletic identification, Type A behavioral pattern and external locus of control, and reported that the athletes with external locus of control showed more superstitious belief and behavior. To sum up, the athletes show more positive psychological characteristics as compared to the non-athletes in the extant literature. The purpose of the current study was to examine how the situational and stable psychological factors differ among the free diving athletes and non-athletes. Based on related literature, it was expected that the athletes would show more positive profile in terms of situational and stable psychological characteristics. In other words, the athletes would report less stress, anxiety and negative affectivity and more internal locus of control in this study.

2 Method

2.1 Participants

36 free diving athletes (10 female, 26 male) who were the members of Middle East Technical University, Sub-Aqua Sports Team (METU-SAS) and 41 non-athletes, (13 female, 28 male) equivalent in terms of age and gender, voluntarily participated in the study. The mean age of the athletes was 23.44 ($SD= 5.61$), the mean height was 175.38 cm ($SD= 8.07$, ranging between 158-190 cm), and the mean weight was 69.11 kg ($SD= 10.52$, ranging between 48-90 kg). The mean age of non-athletes was 23.17 ($SD= 4.88$), the mean height was 174.74 cm ($SD= 9.41$, ranging between 157-194 cm), and the mean weight was 69.00 kg ($SD= 11.18$, ranging between 46-90 kg).

2.2 Procedure

In order to assess the psychological characteristics of the athletes and compare them with the non-athletes, a questionnaire consisting of two sections was prepared. The first section of the questionnaire consisted of a number of demographic questions such as age, gender, height, weight.

The second section of the questionnaire consisted of measures that test the psychological characteristics (stress and anxiety levels, affectivity, coping styles and locus of control) of the participants. The questionnaire was administered to the athletes and non-athletes in a group format at one session that lasted about half an hour.

2. 3 Measures

SCL-40 Symptom Checklist. In order to measure the general stress level, Symptom Checklist (SCL) developed by Derogatis (1977) was used. This 40-item checklist had been used in previous studies to measure the stress level (e.g. Karancı et al., 1999; Karancı & Rüstemli, 1995). Karancı and colleagues (1999) revealed that the internal consistency score of the scale was .92. In the current study, the participants were asked to rate each item on a 3-point Likert scale (1= never, 3= always). The total score of general stress level was obtained by adding the scores of each item. The Cronbach alpha coefficient was calculated as .95 in the present study.

Positive Negative Affect Schedule (PANAS). In order to measure the affect of the participants, Positive Negative Affect Schedule was used. This measure was developed by Watson, Clark and Tellegen (1988) and adapted into Turkish by Gençöz (2000). The 20-item inventory consisted of ten items that measure the positive affectivity and ten items that measure the negative affectivity. Gençöz (2000) revealed that the Turkish-adaptation of PANAS is a reliable and valid tool with internal consistency scores of .83 and .86 for positive and negative affectivity respectively. In this study, participants were asked to rate the extent to which they experience negative and positive affectivity considering their feelings on a 5-point Likert scale (1= never, 5= always). The internal consistency score of each subscale was computed as .91.

Locus of Control Scale. The 47-item Locus of Control Scale developed by Dağ (2002) measures the individual's locus of control through five subscales that assess the general belief in internal locus of control, belief in luck, meaninglessness of effort, fatalism and belief in just world. Dağ (2002) reported the internal consistency of the scale as .92. In the current study, the participants were asked to rate all items on a 5-point Likert scale (1= never, 5= always). The internal consistency score of the scale was computed as .85 in this study.

State-Trait Anxiety Inventory (STAI-I and II). In order to measure the state and trait anxiety levels of the participants, State-Trait Anxiety Inventory was used. The inventory was developed by Spielberger, Gorsuch and Lushene (1970) and adapted into Turkish by Öner and Le Compte (1985). It consists of two subscales of 20-items. The State Anxiety subscale assesses how individuals feel under specific circumstances or conditions. On the other hand, Trait Anxiety subscale measures how individuals feel in general rather than under specific circumstances or conditions. Öner (2006) revealed the internal consistency scores from .34 to .72 for the trait anxiety subscale, and from .42 to .85 for the state anxiety subscale. In this study, the participants were asked to rate the level of anxiety they feel in general and they feel at the time of testing on a 5-point Likert scale (1= never, 5= always) for the state and trait anxiety subscales, respectively. The internal consistency score was computed as .56 for the state anxiety and .76 for the trait anxiety in the current study.

Ways of Coping Questionnaire (WCQ). In order to determine the participants' ways of coping with stress, the Turkish adaptation of 30-item Ways of Coping Questionnaire was used. The original 66-item Ways of Coping Questionnaire developed by Folkman and Lazarus (1988) was shortened into 30 items and it was adapted into Turkish by Şahin and Durak (1995). In their factor analysis, they revealed five subscales, namely self-confident, helpless, submissive, optimistic and seeking social support. The internal consistency scores were reported as .80, .73, .70, .68 and .47 for the five subscales, respectively. In this study, the participants were asked to rate the extend to which they use each coping strategy to cope with stressful situations on a 5-point Likert scale (1=never, 5= always). The internal consistency scores were computed as .85 for self-confident, .86 for helpless, .73 for submissive, .73 for optimistic and .43 for seeking social support, respectively.

3. Results

The independent sample t-test was conducted to compare the free diving athletes with non-athletes on dependent variables. Group membership (being a free diving athlete or not) was the independent variable, whereas the general stress level (SCL), positive affectivity (PANAS P), negative affectivity (PANAS N), state anxiety (STAI I), trait anxiety (STAI II), locus of control (general belief in internal locus of control, belief in luck, meaninglessness of effort, fatalism, belief in just world) and ways of coping (self-confident, helpless, submissive, optimistic, seeking social support) were tested as dependent variables.

In order to see the comparability of the two groups on demographic variables, an independent sample t-test was conducted. The test results revealed no significant differences among the two groups in terms of age, height and weight variables. In other words, the results showed similarities among the two groups on demographical variables. The comparison of the average scores and standard deviations of the two groups on stress, anxiety, affectivity, ways of coping and locus of control variables were presented in Table 1.

Table 1. The Comparison of Free-Diving Athletes with Non-Athletes on Anxiety, Stress, Affectivity, Locus of Control and Ways of Coping; Means and Standard Deviations for the Two Groups

Variables	Athletes (n = 36)		Non-Athletes (n = 41)		T	p
	M	SD	M	SD		
Anxiety						
State Anxiety	37.97	10.98	44.58	12.20	2.485	.015*
Trait Anxiety	46.97	14.17	49.75	11.60	.947	.347
Stress Symptoms	57.77	14.34	67.95	22.76	2.308	.024*
Affectivity						
Positive Affectivity	34.69	7.99	32.51	6.62	- 1.309	.195
Negative Affectivity	16.19	6.48	20.82	7.06	2.984	.004*
Locus of Control						
General Belief in Internal Locus of Control	66.33	9.78	61.07	11.24	- 2.175	.033*
Belief in Luck	24.41	5.10	25.95	4.08	1.463	.148
Meaninglessness of Effort	18.58	4.73	20.97	6.35	1.852	.068
Fatalism	7.75	2.75	7.95	2.96	.307	.760
Belief in Just World	10.11	2.72	10.53	3.87	.550	.584
Ways of Coping						
Self-confident	22.94	4.18	20.92	3.97	- 2.168	.033*
Helpless	16.69	6.44	17.04	5.92	.251	.802
Submissive	10.41	3.38	11.51	3.53	1.384	.171
Optimistic	17.16	3.43	15.95	3.21	-1.603	.113
Seeking Social Support	12.25	2.67	11.92	2.33	-.565	.573

*p< .05

The independent sample t-test that compares the free diving athletes with the non-athletes on the study variables showed that, there are significant differences between the two groups in terms of state anxiety [$t(75) = 2.49, p = .02$], stress level [$t(75) = 2.31, p = .03$], negative affectivity [$t(75) = 2.98, p = .00$], general belief in internal locus of control [$t(75) = -2.18, p = .03$] and self-confident coping strategy [$t(75) = -2.17, p = .03$]. The findings showed that the state anxiety, stress level and negative affectivity scores were significantly lower among the athletes as compared to the non-athletes.

In addition, the free diving athletes scored significantly higher on the general belief in internal locus of control and self-confident coping strategies as compared to the non-athletes. The bivariate correlations among the study variables were analyzed for the groups of free diving athletes and non-athletes separately. Table 2 presents the correlation coefficients among the study variables.

Table2. Correlation Coefficients among Study Variables for Free Diving Athletes and Non-Athletes

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Athletes (n = 36)															
1. State Anxiety	—	.68*	.57*	-.61*	.67*	-.42*	-.14	.26	.07	.07	-.53*	.53*	.25	-.51*	.16
2. Trait Anxiety		—	.78*	-.41*	.68*	-.26	-.02	.28	.10	.20	-.55*	.79*	.55*	-.61*	.36*
3. Stress Symptoms			—	-.04	.77*	.00	.22	.23	.10	.06	-.33*	.65*	.46*	-.40*	.45*
4. Positive Affectivity				—	-.06	.67*	.41*	-.05	-.05	.06	.69*	-.32	-.10	.45*	.02
5. Negative Affectivity					—	-.13	.19	.34*	.07	.13	-.19	.53*	.31	-.39*	.26
6. General Belief in Internal Locus of Control						—	.46*	-.01	-.26	.07	.59*	-.12	-.02	.31	.18
7. Belief in Luck							—	.46*	.00	.08	.42*	-.05	.20	.26	.29
8. Meaninglessness of Effort								—	.07	.47*	-.04	.43*	.38*	-.01	.00
9. Fatalism									—	.18	-.06	.03	.46*	.13	.31
10. Belief in Just World										—	.15	.23	.29	.13	.22
11. Self-confident											—	-.46*	-.19	.61*	.02
12. Helpless												—	.49*	-.60*	.23
13. Submissive													—	.00	.49*
14. Optimistic														—	.00
15. Seeking Social Support															—
Non-Athletes (n = 41)															
1. State Anxiety	—	.51*	.67*	-.13	.59*	.03	.30	.14	.03	.56*	-.10	.50*	.27	-.18	.39*
2. Trait Anxiety		—	.65*	-.43*	.64*	-.05	.33	.43*	.16	.38*	-.50*	.78*	.59*	-.51*	.43*
3. Stress Symptoms			—	-.04	.78*	.19	.41*	.39*	.20	.55*	-.07	.69*	.43*	-.28	.52*
4. Positive Affectivity				—	.02	.41*	.12	-.03	.19	-.02	.57*	-.13	-.05	.38*	.21
5. Negative Affectivity					—	.23	.30	.36*	.18	.48*	-.12	.71*	.58*	-.29	.58*
6. General Belief in Internal Locus of Control						—	.01	-.08	-.05	-.06	.56*	.12	-.27	.35*	.46*
7. Belief in Luck							—	.37*	.28	.62*	.11	.42*	.46*	.07	.44*
8. Meaninglessness of Effort								—	.38*	.52*	-.19	.52*	.54*	-.30	.27
9. Fatalism									—	.34*	.07	.31	.42*	.12	.25
10. Belief in Just World										—	-.01	.70*	.61*	.05	.47*
11. Self-confident											—	-.23	-.35*	.59*	.34*
12. Helpless												—	.74*	-.17	.65*
13. Submissive													—	-.24	.35*
14. Optimistic														—	.06
15. Seeking Social Support															—

*p< .05

As shown in Table 2, the stress symptoms were highly correlated with the negative affectivity, state and trait anxiety level and helplessness style of coping in both groups. Similarly, there was a positive correlation between the general belief in internal locus of control and self-confident coping strategies in two groups. Bivariate correlations also showed some differences among two groups. For instance, the correlation between the belief in luck and the general belief in internal control subscales was significant among the free diving athletes (.46). However, it was nonsignificant among the non-athletes (.01). In a related vein, the correlation between the meaninglessness of effort and fatalism subscales was significant among the non-athletes (.38), while it was no significant among the free diving athletes (.07).

4. Discussion

The current study aimed to compare the free diving athletes with the non-athletes on different psychological characteristics. It can be stated that the findings of the present study are consistent with the related literature. The results showed that the free diving athletes obtained lower scores in the state anxiety, stress symptoms and negative affectivity as compared to the non-athletes. These lower scores indicate that the free diving athletes are individuals who have less stress symptoms, state anxiety and negative affectivity. This finding also converges with the research that revealed positive effect of sport on human psychology (Malebo et al., 2007; Robazza & Bortoli, 2003; Shirka, 2000).

The finding that the free diving athletes score higher in the self-confident coping strategies and general belief in inner control scales is also consistent with the research on this subject (Anshel & Anderson, 2002; Kaiseler, Polman, & Nicholls, 2009; Wijndaele et al., 2007). When we examine the locus of control subscales, we see that the free diving athletes scored higher in the general belief in inner control subscale than the non-athletes. Unexpectedly, they also scored high in the belief in luck subscale (see Table 1). Considering the internal and the external locus of control as two distinct poles, it might be argued that a person scoring high in the internal locus of control would score low in the external locus of control.

Also when the bivariate correlations among the locus of control subscales were examined some differences between the athletes and the non-athletes were observed. As shown in Table 2, the relation of these subscales among the non-athletes was found in accordance with the theory and the expectations of the current study. Conversely, there is a high positive correlation between the internal locus of control and belief in luck among the athletes. This relationship between the two subscales of locus of control in the free diving athletes might be due to learning the effect of luck in sports through experience.

Another difference between the athletes and non-athletes was found in the relationship between the meaninglessness of effort and fatalism subscales. The correlation between these two subscales was significant and positive among the non-athletes; however it was nonsignificant among the athletes. These findings suggest that the athletes have an unexpected profile in the locus of control variables. Finally, lower levels of anxiety, stress level and negative affectivity, and higher levels of belief in inner control and self-confident coping strategies indicate a positive psychological profile among the athletes. Accordingly, it is argued that the individuals that do free-diving sport have more stable positive psychological characters such as high inner locus of control and self-confident coping strategies.

As a result, it can be concluded that the free diving sport has positive effects on both situational and stable psychological characteristics. One limitation of this research is conducting the study with relatively small number of participants. One of the most important reasons for that is the small number of athletes doing free diving sport as compared to the other sport branches. Future research on large number of free diving athletes might provide further support to the findings of the current study.

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