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Investigating the Anxiety of Free-Fall Paratroopers and Its Determining Factors: Experience and Personality Traits in a Military Base

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Abstract

Background: Skydiving anxiety varies according to individual personality traits. Identifying key factors influencing paratroopers' well-being and performance is essential.

Objectives: To investigate the relationship between anxiety and personality traits in free-fall skydivers.

Methods: An analytical study was conducted at a military base in Guilan province, Iran, with free-fall paratroopers selected through random sampling. Data were collected using three questionnaires covering demographics, anxiety levels, and personality factors.

Results: Fifty-eight paratroopers were assessed; 79.3% were under 30 years old. Free-fall paratroopers exhibited higher levels of extraversion and conscientiousness and lower levels of neuroticism. Trait anxiety was found to be higher among those with neuroticism. Experienced paratroopers displayed higher trait anxiety, with no significant relationship to state anxiety, experience level, or age.

Conclusions: High trait anxiety in neurotic paratroopers is meaningful in relation to personality traits examined in this study.

Keywords: Anxiety, Anxiety State, Personality, Neuroticism

1. Background

Skydiving is both physically and mentally demanding, attracting individuals for recreational interest but considered a profession by paratroopers (1, 2). Regular participation leads to skill development, social growth, and comfort in risky situations, as noted in studies (3-5).

Research indicates that stress triggers the fight-or-flight response, activating the hypothalamus-pituitary-adrenal axis and sympathetic nervous system. Studies on skydivers demonstrate how stress elevates energy production and heart rate. Moderate anxiety can drive motivation, while high anxiety impairs performance (6).

Fenz and Epstein found that experienced skydivers had peak anxiety just before jumps, which decreased shortly before and rose again after landing. In contrast, beginners experienced escalating anxiety pre-jump, which subsided after the jump (7).

Advanced skydivers, with more experience, develop self-control mechanisms to manage emotions and anxiety, showing a sharper decline in anxiety closer to the jump. This ability to handle stress improves with experience, resulting in greater happiness and confidence before jumps. Unlike beginners, experienced skydivers can regulate emotions more effectively, reducing the fear of failure (8).

This study examines pre-jump anxiety in paratroopers, aiming to identify factors affecting

anxiety levels and their relationship to personality traits, age, and experience at a military center in Guilan province, Iran.

2. Objectives

To investigate the relationship between free-fall skydivers' anxiety and their personality traits.

3. Methods

A cross-sectional study was conducted in 2022 on 85 paratroopers from a military base in Guilan province. Fifty-eight individuals were ultimately selected for the study due to specific inclusion and exclusion criteria. Inclusion criteria required participants to have free-fall experience from heights of at least 800 meters and up to more than 3000 meters, and be 18 years of age or older. Individuals with severe psychological disorders or those taking neuropsychiatric medications were excluded from the study.

According to Morgan's table, a sample size of 70 was determined using a simple random sampling method. However, due to reasons such as military missions, leave, or lack of consent to participate, 58 paratroopers were included in the study. The study employed a demographic questionnaire, the Spielberger State-Trait Anxiety Inventory, and a short form of the NEO Personality Inventory.

Participants completed self-reported questionnaires to assess state anxiety both before and after a jump. They reported current emotions on the state anxiety scale and usual emotions on the trait anxiety scale. Skydivers' experience levels were categorized based on jump height: beginners up to 800 meters, trained individuals up to 1200 meters, and experienced jumpers over 3000 meters. Questionnaires were administered at various stages of the skydiving experience to capture fluctuations in anxiety levels accurately.

The study protocol received approval from the Research Ethics Committee of Guilan University of Medical Sciences (IR.GUMS.REC.1401.297).

3.1. Measurements

The STAI-X Questionnaire consists of 40 questions designed to measure both state and trait anxiety. Responses are provided on a 4-point scale, with higher scores indicating higher levels of anxiety. Scores are calculated by summing the total scores for 20 statements, with some items scored in reverse. The scores for each anxiety scale range from 20 to 80. The STAI-X has been validated and proven reliable in previous studies, with Cronbach's alphas of 0.886 for trait anxiety and 0.846 for state anxiety in the Persian version. Specifically, in the Persian adaptation of the Spielberger State-Trait Anxiety Inventory, Cronbach's alpha for internal consistency was 0.886 for trait anxiety and 0.846 for state anxiety (9).

The 60-item NEO Personality Inventory Short Form assesses the five personality dimensions of neuroticism, extraversion, openness, agreeableness, and conscientiousness, with each dimension measured by 12 questions on a 5-point Likert Scale. This inventory has been validated for use in Iran, with subscale Cronbach's alphas ranging from 0.58 to 0.83 (10). After administering the questionnaires, answer sheets were reviewed to confirm all questions were completed. If any questions were left unanswered, participants were asked to fill them in. For questions that participants did not understand, they were instructed to select the "I have no opinion" option.

3.2. Statistical Analysis

Data characteristics were summarized using descriptive statistics, with frequencies and percentages reported for categorical variables and means ± standard deviation for continuous variables. Spearman's correlation test and canonical correlation analysis were employed to examine the relationship between anxiety and personality traits. The Mann-Whitney U test and Kruskal-Wallis test were used to compare anxiety scores before and after jumps based on various demographic and experience-based variables. Statistical analyses were conducted using IBM SPSS Statistics v. 22, with significance set at $P < 0.05$.

4. Results

The study found that the majority of participants were under 30 years old (79.3%) and held a bachelor's degree (39.7%). Additionally, 55.2% were married, and 22.4% had between 10 - 19 years of service experience. Most free-fall paratroopers were beginners (58.6%). Before the jump, 8.6% exhibited high state anxiety, which decreased to 3.4% after the jump. Trait anxiety levels showed that 17.2% of participants had low anxiety, while 31% reported average anxiety. Overall, the results indicate fluctuations in anxiety levels before and after the jump, with a notable decrease in state anxiety and a mix of low and average trait anxiety among participants (Table 1).

The neuroticism personality trait displayed a significant inverse correlation with anxiety scores before and after the jump, as well as with trait anxiety scores, with a particularly strong correlation observed with trait anxiety. State anxiety scores, both before and

Table 1. Distribution of the Level and Score of State and Trait Anxiety in Free Fall Paratroopers Before and After Jump

Anxiety Level	Percentage	Average ± Standard Deviation
State anxiety level before jump		40.16 ± 10.44
Non or the lowest level	13 (22.4)	
Low	18 (31)	
Average	22 (37.9)	
High	5 (8.6)	
State anxiety level after jump		39.83 ± 12.14
Non or the lowest level	19 (32.8)	
Low	9 (15.5)	
Average	28 (48.3)	
High	2 (3.4)	
Trait anxiety		37.38 ± 10.52
Non or the lowest level	30 (51.7)	
Low	10 (17.2)	
Average	18 (31)	
High	0	

after the jump, showed direct relationships with most other factors, except for openness, which was not significant. The correlation with other NEO personality factors was significant but moderately low. Trait anxiety scores showed moderate to high correlations with all factors except openness. Neuroticism scores exhibited a reverse correlation with anxiety but showed a direct relationship with other significant factors (Table 2). The canonical correlation was statistically significant between anxiety type and personality type (rc = 0.74, Wilks Lambda = 0.447, $P < 0.001$).

The study found that jump height was not significantly related to trait or state anxiety levels before and after the jump. Free-fall paratroopers with a high school diploma exhibited significantly lower levels of state anxiety ($P = 0.007$) and trait anxiety ($P = 0.01$) compared to other educational groups. Age was not a significant factor in anxiety scores. However, experienced paratroopers had significantly higher trait anxiety scores ($P = 0.013$) compared to less experienced participants. No significant relationship was found between state anxiety and experience level.

The data analysis further indicated that the average trait anxiety score ($P = 0.013$) was higher in experienced paratroopers, a difference that was statistically significant. However, no significant relationship was observed between state anxiety and the level of experience (Table 3).

5. Discussion

The study found no significant difference in state anxiety levels among free-fall paratroopers before and after jumping. However, Boldak and Guszkowska reported a decrease in anxiety levels post-jump (11). Similarly, Meyer et al. and Hare et al. found no significant relationship between anxiety levels before and after jumps (12, 13). Although experienced paratroopers had higher trait anxiety scores, no clear link was found between state anxiety and experience levels. Boldak and Guszkowska also observed a connection between anxiety and experience, with beginners showing a greater decrease in anxiety levels after jumping compared to experienced skydivers (11).

Meyer et al. reported no significant link between the anxiety levels of experienced and beginner skydivers (12). In contrast, Price et al. indicated a connection between a skydiver's experience and anxiety levels, both before and after a jump (14). Clemente-Suárez et al. found that beginner skydivers exhibited the highest pre-jump anxiety levels but also experienced a more substantial reduction in anxiety post-jump, though their post-jump anxiety remained higher than that of experienced skydivers and controls (15).

Most studies suggest a strong link between experience level and anxiety among parachutists, although how samples are divided, how experience is measured, and other factors like personality type and job can disrupt this relationship in certain cases (11, 12, 14). In the present study, results revealed that extraversion and openness were the most common personality traits among free-fall paratroopers, while neuroticism was the least common. Participants with higher neuroticism scores showed the highest trait anxiety, suggesting a significant connection between

Table 2. Relation Between the Anxiety Score and the Personality Factors Score of the NEO Questionnaire in the Studied Free Fall Paratroopers

Personality Traits	State Anxiety Score Before Jump	State Anxiety Score After Jump	Trait Anxiety Score After Jump
	Correlation Coefficient	Correlation Coefficient	Correlation Coefficient
Neuroticism	0.320 [a]	0.430 [c]	0.640 [c]
Extraversion	- 0.255	- 0.292 [a]	- 0.561 [c]
Openness	- 0.151	0.054	- 0.21
Agreeableness	- 0.315 [a]	- 0.361 [b]	- 0.568 [c]
Conscientiousness	- 0.213	- 0.412 [c]	- 0.550 [c]

[a] $P < 0.05$.
[b] $P < 0.01$.
[c] $P < 0.001$.

Table 3. Comparison of State and Trait Anxiety Scores According to Years of Service and Jumping Experience in the Studied Free Fall Paratroopers [a]

Variables	State Anxiety Score Before Jump	State Anxiety Score After Jump	Anxiety Score Variations	Trait Anxiety Score After Jump
Years of service				
1 - 9	39.29 ± 10.43	40.00 ± 12.85	0.71 ± 12.85	36.84 ± 10.32
10 - 19	43.15 ± 10.32	39.23 ± 9.70	-3.92 ± 10.63	41.23 ± 10.92
P	0.232	0.644	0.399	0.148
Experience in free fall parachuting				
Beginner free fall paratrooper	39.76 ± 9.99	41.21 ± 12.36	1.44 ± 13.39	38.00 ± 10.62
Trained free fall paratrooper	37.56 ± 12.91	31.56 ± 11.75	-6.00 ± 8.72	29.56 ± 4.56
Experienced free fall paratrooper	42.60 ± 10.10	41.67 ± 10.44	-0.93 ± 11.68	42.40 ± 10.31
P	0.468	0.098	0.183	0.013

[a] Values are expressed as mean ± SD.

personality type and trait anxiety levels in free-fall parachutists (16).

The study found no significant correlation between jump height and levels of trait or state anxiety before or after the jump. Previous research has typically focused on the number of jumps rather than jump height (11). Among free-fall paratroopers, those with a high school diploma showed lower levels of state and trait anxiety post-jump. This may be attributed to beginning their careers earlier and gaining more experience, suggesting that both education and experience may impact anxiety levels.

Footnotes

Authors' Contribution: Study concept and design: S. M. S.; drafting of the manuscript: N. N. R. and A. E. N.; critical revision of the manuscript for important intellectual content: A. H.; collected the clinical data: R. G.

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Informed Consent: The information/video/photographic material will be used only in educational publications intended for health professionals (1) My name will not be published and Wiley will endeavour to ensure that I cannot be identified from the clinical information, other than in relation to identifiable material (such as

videos/photographic material) for which I give consent. However I also understand that there is a low possibility that I may be identified from the clinical information. (2) If the publication or product is published on an open access basis, I understand that it may be accessed freely throughout the world.

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