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Mental State of Pregnant Women Engaged in Specialized Gymnastics

Petkova-Nesheva I*

National Sports Academy "Vasil Levski," Sofia, Bulgaria

***Corresponding author:** Irina Petkova Nesheva, Faculty of Public Health, Health Care and Tourism, Department of Gymnastics, Bulgaria, ORCID: https://orcid.org/0000-0002-0436-6398

Research Article

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Abstract

Pregnancy is a period of significant physiological and psychosocial changes, during which assessment of mental state may complement the comprehensive characterization of maternal health. The aim is to analyze state and trait anxiety and the main parameters of mental state in women with normal pregnancy engaged in specialized gymnastics. The study included 32 women with normal pregnancy, aged 22–38 years, in the second trimester of pregnancy. Measurements were performed after a session of specialized gymnastic exercises. The Spielberger questionnaire, the Lüscher Color Test, and A. A. Karmanov's method for assessing the main parameters of mental state were used. The results showed that state anxiety was M=32.25 (SD=5.97), while trait anxiety was M=33.84 (SD=7.37). The mean values of mood–frustration, spontaneity–dependence, and rigidity–trance were 3.53, 5.69, and 3.77, respectively. Correlations of r=−0.58 and r=0.52 were established. The results describe the mental profile of the specific study group. The results provide a basis for further in-depth research of the Program as a comprehensive model for psychophysical support of women during pregnancy.

Keywords: Pregnancy; Anxiety; Mental State; Physical Activity; Specialized Holistic "Nesheva Program"; Psychophysiological Adaptation

Abbreviations: MF: Mood Frustration; SD: Spontaneity Dependence; and RT: Rigidity Trance.

Introduction

Pregnancy is a physiological period associated with complex physical, hormonal, and psychosocial changes. In this context, assessment of mental state is important as part of comprehensive monitoring of women's well-being.

Current literature considers physical activity as a potential component of support for perinatal mental health. A global review of systematic reviews and meta-analyses published in 2026 summarizes the available evidence on the relationship between physical activity and depressive and anxiety symptoms in the perinatal period [1]. Previous systematic reviews have also examined prenatal anxiety and physical activity [2,3].

A number of authors have examined physical training in pregnant women and the public health aspects of mental health and support during the antenatal period [4-6].

Karmanov's approach, developed on the basis of the Lüscher Test, was used to assess the main parameters of mental state [7]. It allows quantitative description of selected characteristics of mental state.

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Bulgarian scientific literature also reflects interest in the relationship between physical activity, psychophysical state, and women's health during pregnancy. Nesheva [8] examined the influence of gymnastics in women with normal pregnancy, emphasizing the comprehensive effects of physical activity on the condition of the pregnant woman. In the broader context of recreational and wellness activities, Dimitrova [9] examined the importance of specialized physical and recreational practices for maintaining physical and mental well-being. The studies by Angelova and Petrova [10] draw attention to the relationship between stress, psychological functions, and psychosomatic responses of the body, including through heart-rate indicators. In this context, the data reported by Angelova and coauthors [11] contribute to understanding the psychosomatic manifestations of stress and their relationship with the functional state of the organism. These research directions support the need to consider the mental state of pregnant women in the context of the complex interaction between physical activity, psychoprophylactic interventions, and psychophysiological responses.

The present study is part of a broader project assessing the physical, physiological, and mental characteristics of women with normal pregnancy. The presented part focuses on anxiety and the main parameters of mental state after sessions of specialized gymnastics.

Aim

The aim of the study is to analyze state and trait anxiety and the main parameters of mental state in women with normal pregnancy engaged in a specialized physical activity program – gymnastics.

Methods

Psychological assessment was performed using three complementary instruments. The Spielberger questionnaire was used to assess state anxiety and trait anxiety. The Lüscher Color Test was used to assess color-selection indicators, including anxiety intensity and unfavorable compensation. Karmanov's method, developed on the basis of the Lüscher Test, was used to quantify the main mental-state parameters: mood–frustration (MF), spontaneity–dependence (SD), and rigidity–trance (RT) [7].

The study included 32 women with normal pregnancy in the second trimester, aged 22–38 years. Participants were recruited through an advertisement inviting pregnant women to participate in the study. Eligibility required a normal pregnancy, a recommendation from an obstetrician-gynecologist confirming suitability for participation in the specialized gymnastics program, and signed informed consent. Women without the required obstetrician-gynecologist recommendation or without informed consent were not included. The specialized gymnastics methodology was developed and described in the author's doctoral dissertation [8]. The intervention consisted of two 60-minute sessions per week and included specially selected exercises and dance steps, performed at moderate intensity. Measurements were collected during the period 2010–2014 and were performed after a session of specialized gymnastic exercises and wellness physical-activity practices. The presented measurements were treated as primary study data.

The original methodology presents the formulas for calculating the indicators based on the positions of the colors and the corresponding table for converting the obtained results into values on the nine-point standard scale – stanines [7].

Statistical processing included descriptive statistics (Min, Max, M, SD) and correlation analysis to examine relationships between the indicators. The original statistical record does not specify whether Pearson or Spearman correlation was used; therefore, the correlation coefficients are reported without assigning a specific correlation procedure.

Ethical considerations: The study was conducted in 2010–2014. At the time of data collection, formal ethical committee approval was not required for this type of study. All participants provided informed consent, and participation was based on a recommendation from an obstetrician-gynecologist.

Results

The descriptive results are presented in Table 1. To avoid mixing indicators measured on different scales, the graphical presentation was organized into separate panels.

INDICATOR	Min	Max	M	SD
Anxiety intensity	0	4	1.31	1.39
Unfavorable compensation	0	5	1.15	1.81
Mood–frustration	1	7	3.53	1.93
Spontaneity–dependence	4	8	5.69	1.21
Rigidity–trance	2	6	3.77	1.38
State anxiety	20	41	32.25	5.97
Trait anxiety	21	47	33.84	7.37

Table 1: Descriptive indicators of mental state in the study group (n=32).

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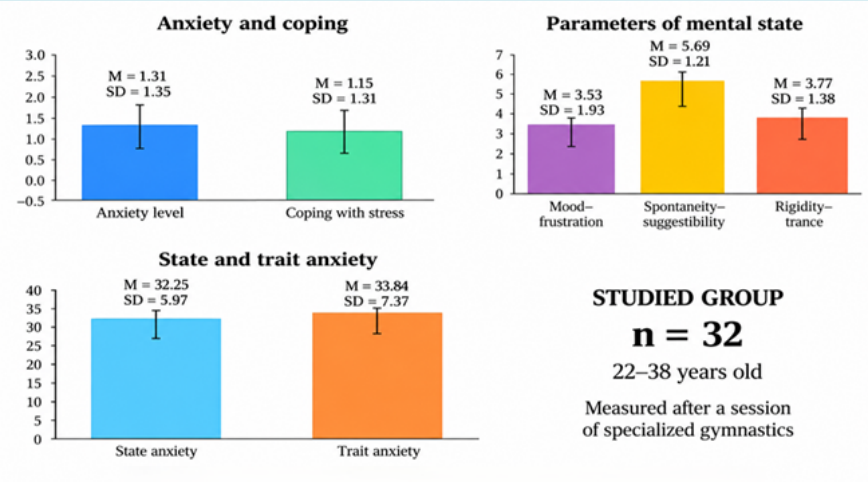


Figure 1: Profile of the assessed mental indicators. Values are presented as M ± SD.

State anxiety was M=32.25 (SD=5.97), while trait anxiety was M=33.84 (SD=7.37). For the Karmanov indicators, the mean values were MF=3.53 (SD=1.93), SD=5.69 (SD=1.21), and RT=3.77 (SD=1.38). The anxiety index from the Lüscher Color Test was M=1.31, and unfavorable compensation was M=1.15. The three Karmanov indicators were additionally compared with the published table for converting raw scores into stanines [7]. A stanine is a nine-point standardized scale; however, an individual normative status should not be assigned automatically to a group mean.

INDICATOR	M	Reference interval	Stanine by interval	Description
Mood–frustration	3.53	1–7	5	The mean value falls within the interval for stanine 5.
Spontaneity–dependence	5.69	2–5 / 6–9	between 7 and 8	The group mean lies between two complete normative intervals; no exact stanine is assigned.
Rigidity–trance	3.77	3–7	5	The mean value falls within the interval for stanine 5.

Table 2: Comparison of group mean values with Karmanov's table for converting raw scores into stanines.

Table 2 presents the quantitative positioning of the group mean values relative to Karmanov's reference scale [7]. The comparison is descriptive and should not be interpreted as an individual psychodiagnostic assessment or as a basis for categorizing the group.

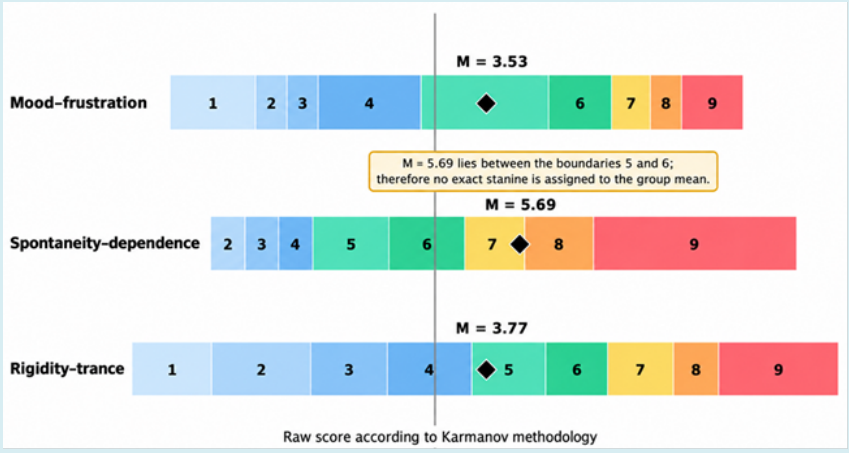


Figure 2: Karmanov normative reference map. The colored segments show the intervals for stanines 1–9; the diamond indicates the group mean.

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Correlation analysis established a negative relationship between state anxiety and the SD indicator (r=−0.58) and a positive relationship between trait anxiety and the RT indicator (r=0.52). These coefficients describe the direction and degree of association within the study group and do not demonstrate a causal relationship. Within the observed group, higher state anxiety was associated with lower SD values, while higher trait anxiety was associated with higher RT values. These associations should be interpreted only in relation to the constructs represented by the applied instruments and should not be taken as evidence that anxiety causes changes in behavior or mental-state characteristics.

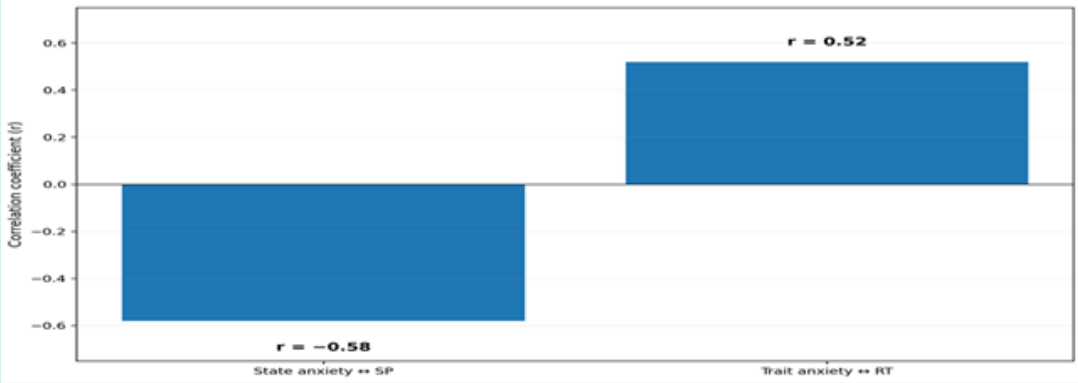


Figure 3: Correlations between anxiety and mental-state parameters.

Discussion

The results outline a descriptive profile of the 32 pregnant women at the time of measurement. State and trait anxiety were represented by mean group scores of 32.25 and 33.84, respectively. These values describe the average scores of the study group and should not be interpreted as individual diagnostic classifications. Trait anxiety does not imply that every woman will necessarily exhibit elevated state anxiety at the time of assessment; the two constructs describe different aspects of anxiety and may vary across situations.

In the reference comparison with Karmanov's table, MF and RT fall within the interval corresponding to stanine 5. The SD mean value of 5.69 lies between the raw-scale boundaries of 5 and 6 and therefore cannot be methodologically converted into an exact stanine. The observed correlations, r=−0.58 and r=0.52, indicate inverse and direct relationships, respectively, between the variables considered. Without individual data, temporal sequencing, and control of potential confounding factors, the direction of influence cannot be determined.

The findings are consistent with scientific interest in the role of physical activity and psychoprophylactic interventions during pregnancy. Systematic reviews examine the relationship between prenatal physical activity and anxiety and depressive symptoms [1–3]. In the present study, the observed indicators of anxiety and mental state were measured following physical activity and psychoprophylactic methods within the "Nesheva Program". These findings may be consistent with the assumption that the combined application of physical activity and psychoprophylactic methods could be associated with lower anxiety in pregnant women. This statement represents a research hypothesis rather than a demonstrated intervention effect. Because the study was descriptive and correlational and did not include baseline measurements, a control group, or an experimental comparison, the findings cannot establish that the program caused a reduction in anxiety or changes in psychophysiological functioning.

In a broader public health context, Smith (2026) emphasizes the importance of neonatal health care as a public health imperative for building healthier societies, highlighting the relevance of health promotion and preventive approaches across the maternal and neonatal continuum [12].

Conclusion

The findings provide a clear and substantial profile of anxiety and selected mental-state characteristics among pregnant women participating in specialized gymnastics. The observed relationships between anxiety and the Karmanov parameters demonstrate meaningful associations among the assessed psychological characteristics and strengthen the scientific relevance of a comprehensive approach combining specialized gymnastics and psychoprophylactic methods. The results support the view that the "Nesheva Program" represents a promising framework for psychophysical support during pregnancy and provide a strong basis for its further scientific development and evaluation. At the

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same time, the descriptive and correlational design, without baseline measurements, a control group, or an experimental comparison, does not permit a causal conclusion that the program reduces anxiety or produces psychophysiological improvement. The present findings should therefore be understood as a scientifically grounded hypothesis regarding the program's potential, providing a strong rationale for future controlled and longitudinal research to verify its effectiveness.

Conflict of Interest

The author declares no conflict of interest.

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Statement

Artificial intelligence tools AI were used solely for language editing and translation into American English.

References

1. Mohr E, Ludwig Walz H, Pieper D, Guthold R, Kaus M, et al. (2026) Physical activity and perinatal depression and anxiety: a global umbrella review and meta-meta-analysis. E Clinical Medicine 98: 104054.

2. Sánchez Polán M, Silva Jose C, Franco E, Nagpal TS, Gil-Ares J, et al. (2021) Prenatal anxiety and exercise: systematic review and meta-analysis. J Clin Med 10(23): 5501.

3. Davenport MH, McCurdy AP, Mottola MF, Skow RJ, Meah VL, et al. (2018) Impact of prenatal exercise on both prenatal and postnatal anxiety and depressive symptoms: a systematic review and meta-analysis. Br J Sports Med 52(21): 1376-1385.

4. Petraconi N, Serra TF (2023) Physical training for pregnant women: the theoretical knowledge and what is recommended in gyms. Public Health Open Access 7(1): 1-10.

5. Pathak V, Verma D, Manglani A (2023) Barriers and challenges in mental healthcare utilization among pregnant women in rural India: a narrative review. Public Health Open Access 7(2): 000253.

6. Kaveri M, Kumar AIK (2023) Perceptions of antenatal women, husband and health service providers on husband being birth companion during childbirth: a qualitative study. Public Health Open Access 1(1).

7. Karmanov AA (1999) Method for Diagnosing the Main Parameters of Mental State Using the Lüscher Test. Imaton, Saint Petersburg, Russia.

8. Nesheva I (2014) Influence of Gymnastics in Women with Normal Pregnancy [dissertation]. Sofia, pp. 1–186.

9. Dimitrova B (2023) Educational policy, specialised staff, innovations and recreational industry. Strategies for Policy in Science and Education 31(5): 532-546.

10. Angelova P, Petrova E (2014) Impact of stress on the psychological functions and the psychosomatic cardiovascular conditions in humans: assessment by the heart rate variability method. Psychological Research 16(1): 111-120.

11. Angelova P, Adem K, Garov V, Gugutkov D, Kokhan S (2023) Psychosomatic effect of stress on heart rate variability. Proceedings of the III International Scientific-Practical Conference "COVID-19: Economic and Social Implications of the Evolution of the Virus" (RTCOV 2023).

12. Smith K (2026) Neonatal Health Care: A Public Health Imperative for Building Healthier, Societies. Public H Open Acc 10(1): 000311.

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