Social adaptation of sporting students: psycho-physiological health tests and analysis

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Abstract

Objective of the study was to test benefits of the sporting students' social adaptation profiling psychophysiological health test system.

Methods and structure of the study. We run the psychophysiological health testing educational experiment at the Environmental Stressors and Adaptation Research Laboratory of the Ural State University of Physical Culture's Physiology Department in 2016 through 2020. We sampled, on a voluntary random basis, the first-, second- and third-year sporting Ural State University of Physical Culture students (n=254) and tested them for attention-deficit hyperactivity disorder (ADHD) symptoms by the Toulouse-Pieron test. Based on the test data, we further composed an Experimental group (n=25, 8.7%) of the ADHD-diagnosed students and Reference Group (n=25) of their ADHD-free peers. The groups were tested by the NS-PsychoTest set with prior verbal instructions. The nervous/ cardiovascular system functionality exposures to stressors were tested by the Loskutova Test. The regulatory system responses and stress tolerances were tested by the computerized Polyspectr-ANS Test system based on the heart rate variability profiles. The heart rate was measured for five minutes within some 300 cardiac cycles. The electrocardiograms were analyzed automatically with prior processing of artifacts. Based on the test data, we computed a stress index i.e. the heart rate control centralization ratio.

The individual social adaptation progress was tested by the standard academic and competitive progress rating systems.

Conclusion. The study data and analyses found the ADHD-diagnosed sporting students more exposed to stressors. A regression analysis showed the stress tolerance and nervous system functionality tests being beneficial for the sporting students' social adaptation profiling purposes. The study findings demonstrate the need of the ADHD-diagnosed sporting students for an efficient social adaptation tracking service. Regular physical activity is recommended as beneficial for their emotional and social adaptation progress proved associated with the academic and competitive progress. The physical education faculties are recommended using a wide range of efficient individualized training methods, models and tools customizable for the psycho-physiological test data of the health group.

Keywords: *psychophysiology, social adaptation, sporting students, progress, Toulouse-Pieron test, simple visual-motor response, heart rate variability.*

Background. A comprehensive student health monitoring system implemented at the university offers, among other things, psychophysiological health tests for sporting students diagnosed with attention-deficit hyperactivity disorder (ADHD) symptoms to rate their social adaptation. The social adaptation means herein "the process of active individual adaptation to the social environment classifiable by types of environmental interactions" [3]. Academic progress is known to claim high psychophysiological resources and expose students to multiple stressors that may suppress the nervous system functionality (NSF) and distress the circulatory system. Well-designed psychophysiological tests give the means to track individual responses to the combined mental and physical stress in the educational process [7]. We believe that the academic system with its high mental and physical stressors needs a well-designed adaptive-compensatory behavior control service to help the sporting students cope with stresses; such service will be designed to harmonize the physiological and psychological

Table 1. Social adaptation rating psychophysiological test data of the sporting students (M±δ), points

Group	Stress index	System functionality, points	Stress tolerance	Academic progress	Competitive progress
EG	18,2±3,3***	4,2±0,3	97,4±25,1***	3,3±0,2	2,8±0,2*
RG	7,0±5,0	4,9±0,2**	58,2±23,2	4,3±0,7*	1,5±0,5

*Note: intergroup difference significance rates: *p<0.05; **p< 0.01; ***p<0.001*

systems to facilitate the individual social adaptation and contribute to the professional progress, with the academic progress and social adaptation tests applicable to rate the potential competitiveness of the physical education university bachelors.

Objective of the study was to test benefits of the sporting students' social adaptation profiling psychophysiological health test system.

Methods and structure of the study. We run the psychophysiological health testing educational experiment at the Environmental Stressors and Adaptation Research Laboratory of the Ural State University of Physical Culture's Physiology Department in 2016 through 2020. We sampled, on a voluntary random basis, the first-, second- and third-year sporting Ural State University of Physical Culture students (n=254) and tested them for ADHD symptoms by the Toulouse-Pieron test [6]. Based on the test data, we further composed an Experimental group (n=25, 8.7%) of the ADHD-diagnosed students and Reference Group (n=25) of their ADHD-free peers. The groups were tested by the NS-PsychoTest set (by Neurosoft Ltd., Ivanovo) [5] with prior verbal instructions. The nervous/ cardiovascular system functionality exposures to stressors were tested by the Loskutova Test that generates individual consolidated response times indicative of the integral system functionality for the total test period. The computerized test system automatically produces the individual system functionality rates [5]. The regulatory system responses and stress tolerance were tested by the computerized Polyspectr-ANS Test system (by Neurosoft Ltd., Ivanovo) based on the heart rate variability profiles [6]. The heart rate was measured for five minutes within some 300 cardiac cycles. The electrocardiograms were analyzed automatically with prior processing of artifacts. Based on the test data, we computed a stress index i.e. the heart rate control centralization ratio [1].

The individual social adaptation progress was tested by the standard academic and competitive progress rating systems. Thus the group academic performance was rated a 5-point scale as poor (1), unsatisfactory (2), satisfactory (3), good (4) and excellent (5), respectively; and the competitive progress was rated by the Competitive Progress Self-rating Survey on the same 5-point scale as very unhappy [with progress] (1), rather unhappy than not (2), rather satisfied (3), rather happy than not (4); and very happy (5). The test/ survey data were statistically processed by Jamovi software toolkit, with the intergroup differences rated for meaning by the Mann-Whitney U-test.

Results and discussion Table hereunder gives the test data.

The stress tolerance tests found the EG more exposed to stressors than the RG as verified by the lower system functionality rates indicative of the current functionality of the central nervous system. The system functionality / stress tolerance test rates urged further medical examinations that found sympathicotonia in the EG and normotonia in the RG. Furthermore, the EG demonstrated the 23.2% lower academic progress than the RG. On the competitive progress scale, however, the EG was tested 53.6% higher than the RG. A test data correlation analysis found clear positive correlations of the system functionality / stress tolerance test rates with the academic/ competitive progress. The correlation vectors and specifics showed a direct correlation of the stress exposure with the system functionality / stress tolerance and academic/ competitive progress rates.

Conclusion. The study data and analyses found the ADHD-diagnosed sporting students more exposed to stressors. A regression analysis showed the stress tolerance and nervous system functionality tests being beneficial for the sporting students' social adaptation profiling purposes. The study findings demonstrate the need of the ADHD-diagnosed sporting students for an efficient social adaptation tracking service. Regular physical activity is recommended as beneficial for their emotional and social adaptation progress proved associated with the academic and competitive progress. The physical education faculties are recommended us-

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