



The effect of auditory and sensory stimuli – from contemporary music subcultures – on the functional state of young athletes

UDC 61

PhD, Associate Professor **L.A. Marchik**¹PhD, Associate Professor **V.V. Shurekov**²**I.A. Abubekyarov**³¹ Ulyanovsk State University of Education, Ulyanovsk² Moscow State University of Civil Engineering (National Research University), Moscow³ Ulyanovsk State University, Ulyanovsk

Corresponding author: nodes@list.ru

Received by the editorial office on 09.03.2026

Abstract

Objective of the study is to determine the impact of contemporary musical styles (rock, electronic music, rap) on the mental and functional states of young athletes.

Methods and structure of the study. First-year students of the Faculty of Physical Education and Sports at Ulyanovsk Pedagogical University, aged 18-20, participated in the study (40 males and 30 females). Cardiorespiratory parameters were determined: heart rate (HR), respiratory rate (RR), blood pressure (BP), physical fitness level (PCL) according to the Pirogova method (1986), and state anxiety indicators according to the Spielberg-Khanin method (1976), before and after listening to music of the specified genres.

Results and conclusions. Baseline HR values were 63.71 ± 3.42 bpm and 64.23 ± 1.31 bpm for males and females, respectively. Listening to music of each of the specified genres causes an increase in heart rate and blood pressure in all subjects. Rap increases heart rate by an average of 6% and blood pressure by 3%; electronic music – heart rate by 8% and blood pressure by 5%, rock – heart rate by 14% and blood pressure by 9%. Changes in respiratory rate are similar. At rest, it is 13.71 ± 0.57 times/min in young men and 15.77 ± 0.31 times/min in young women. Rap increases respiratory rate by 7%, electronic music by 14%, and rock by 28%. Before listening to music, the UFS is 0.714 ± 0.03 conventional units and is assessed as "above average". The UFS of young women is 0.712 ± 0.05 conventional units and is assessed as "high". After listening to music, the functional state of both boys and girls decreases and moves to a lower functional class: "average" for boys, "above average" for girls. Listening to rock music causes the greatest decrease in the functional state level. In boys, the functional state decreases by 16.53% (0.596 ± 0.02 standard units), and in girls, by 22.75% (0.550 ± 0.01 standard units).

The average group level of state anxiety in boys before listening to music is 35.71 ± 1.14 points, assessed as "moderate." After listening to rap, it remains within the "moderate" range, but increases to 38.0 ± 0.86 points (6.4% of the baseline). After listening to electronic music, the average group anxiety score increased to 39.0 ± 1.43 points (a 9.2% increase from the baseline), and after listening to rock music, it increased to 43.14 ± 1.71 points (a 20.8% increase).

Girls had significantly higher baseline anxiety levels than boys, at 43.85 ± 0.77 points, falling somewhere between "moderate" and "high." After listening to rap, the average group anxiety score increased to 45.77 ± 0.69 points (a 4.4% increase), placing the anxiety level at "high." After listening to electronic music, the anxiety level increased to 47.85 ± 0.85 points (a 9.1% increase), and after listening to rock music, it reached 52.92 ± 0.77 points, an increase of 20.7%.

Keywords: musical subcultures, functional state of the body, cardiorespiratory system, heart rate, blood pressure, respiratory rate, level of physical fitness, psychophysiological state, situational anxiety.

Introduction. Nowadays, music is one of the most accessible art forms and is extremely popular amongst young people in education. Engaging with music requires little effort, intense concentration or significant financial outlay [2, 4, 9]. The specific nature of music's impact on human mental and physiological functions has long been of interest to researchers in the ancient world; these studies are particularly relevant

today, when people's lives are overwhelmed by information, noise and stressors [1, 3, 7, 8, 10, 19, 21, 22, 25, 26, 28]. People's musical preferences have also changed, leading to the formation of various groups and communities of fans of particular styles and genres [1, 5, 6, 11–14].

Today, there are numerous youth music styles, each of which has its own followers aged between



14 and 25, a period when a person's personality is formed [9, 11, 16, 17]. The most interesting of these (rock, electronic music, rap) are those around which stable subcultures have already formed; it is precisely such major trends that shape the spiritual outlook and worldview of the younger generation [5, 6, 23, 24, 27].

Objective of the study is to determine the impact of contemporary musical styles – subcultures – on the physical and mental well-being of young athletes.

Methods and structure of the study. This study was conducted at the Functional Diagnostics Laboratory of the Department of Human Biology and Foundations of Medical Knowledge at Ulyanovsk State University of Education named after I.N. Ulyanov at the start of the first semester of the 2025–2026 academic year. The study involved 70 first-year students from the Faculty of Physical Education and Sport, aged 18–20 (40 males and 30 females).

In accordance with the aim of this study, changes in the parameters of the subjects' functional and mental states under the influence of rock, rap and electronic music were determined. Heart rate (HR), respiratory rate (RR), blood pressure (BP) and level of physical fitness [15], and situational anxiety scores using the Spielberger-Hanin method [20], both before and after listening to the specified genres of music for 30 minutes. For each musical genre, the study included 10 repetitions (conducted over 10 days), and the mean values of the studied indicators were determined.

Results of the study and discussion. The results of the study are presented in Table 1. As can be seen, the blood pressure readings for both young men and women prior to listening to music fall within the age-

related normal range and are as follows: systolic pressure – 117.71 ± 2.42 mm Hg and 123.15 ± 1.92 mm Hg respectively; diastolic pressure – 75.86 ± 1.72 mm Hg and 80.15 ± 1.23 mm Hg respectively.

Listening to music of each genre (rap, electronic music, rock) causes an increase in blood pressure in all subjects. In young men, rap caused an increase in blood pressure on average from 118/80 mm Hg to 122/80 mm Hg; electronic music to 123/82 mm Hg; and rock to 129/86 mm Hg. These musical genres have a similar effect on the blood pressure of young women, raising it from 123/80 mm Hg to 127/84 mm Hg for rap, to 129/85 mm Hg for electronic music, and to 134/89 mm Hg. Thus, rap raises blood pressure by approximately 3%, electronic music by 5%, and rock by 9%.

In young men, heart rate after listening to rap rises on average from 64 bpm to 68 bpm, after listening to electronic music to 70 bpm, and after listening to rock to 73 bpm. In young women, the heart rate increases from 64 bpm to 67 bpm after listening to rap, to 68 bpm after electronic music, and to 73 bpm after rock. Thus, rap increases the heart rate by an average of 6%, electronic music by 8%, and rock by 14%.

Listening to these genres of music also increases the respiratory rate. Whilst at rest, the average respiratory rate for young men is 14 breaths per minute, and for young women 16 breaths per minute, after listening to rap the figure rises to 15 and 17 breaths per minute, after listening to electronic music to 16 and 18 breaths per minute, and after listening to rock to 18 and 19 breaths per minute, respectively. In percentage terms, rap increases the respiratory rate by 7%, electronic music by 14%, and rock by 14% after listening to music associated with contemporary youth sub-

Table 1. Cardiorespiratory parameters of the subjects before and after listening to music

Musical genre	Systolic BP, mm Hg		Diastolic BP, mm Hg		HR, bpm		RR, breaths per minute	
	1	2	1	2	1	2	1	2
Young men								
Rap	117,71±2,42	121,71±2,57	75,86±1,72	80,42±1,43	63,71±3,42	68,14±3,57	13,71±0,57	15,29±0,71
Electronic music	117,71±2,42	123,71±2,14	75,86±1,72	82,71±1,14	63,71±3,42	69,57±3,57	13,71±0,57	16,43±0,43
Rock	117,71±2,42	128,88±1,43	75,86±1,72	85,86±0,86	63,71±3,42	73,00±2,86	13,71±0,57	17,57±0,43
Young women								
Rap	123,15±1,92	127,46±1,77	80,15±1,23	84,31±1,15	64,23±1,31	66,84±1,38	15,77±0,31	17,31±0,32
Electronic music	123,15±1,92	128,92±1,77	80,15±1,23	85,46±1,31	64,23±1,31	67,84±1,31	15,77±0,31	17,77±0,15
Rock	123,15±1,92	133,69±1,15	80,15±1,23	88,61±1,15	64,23±1,31	72,46±1,07	15,77±0,31	18,54±0,07

1 – baseline values; 2 – values following exposure to music

Table 2. Levels of physical condition and situational anxiety among participants before and after listening to music from various musical subcultures

Musical genre	PFL, standardised units		Level of situational anxiety, points	
	1	2	1	2
Young men				
Rap	0,714±0,03 above average	0,663±0,04 average	35,71±1,14 moderate	38,0±0,86 moderate
Electronic music		0,653±0,02 average		39,0±1,43 moderate
Rock		0,596±0,02 average		43,14±1,71 moderate
Young women				
Rap	0,712±0,005 high	0,661±0,01 above average	43,85±0,77 moderate	45,77±0,69 high
Electronic music		0,600±0,01 above average		47,85±0,85 high
Rock		0,550±0,01 above average		52,92±0,77 high

1 – baseline values; 2 – values following exposure to music

cultures. Before listening to music, the young men's physical fitness level (PFL) is 0.714 ± 0.03 standard units and is assessed as 'above average'. The PFL for young women is 0.712 ± 0.05 standard units and is classified as 'high'. After listening to music, the PFL for both young men and young women decreases and shifts to a lower functional class: 'average' for young men and 'above average' for young women. After listening to rap, the PFL for young men is 0.663 ± 0.04 standard units (a decrease of 7.14%), and for young women it is 0.661 ± 0.01 standard units (a decrease of 7.16%). After listening to electronic music, the PFL for young men decreased by 8.54% to 0.653 ± 0.02 conventional units, whilst for young women the decrease was 15.73% to 0.600 ± 0.01 conventional units. Listening to rock music causes the greatest decline in functional status. In young men, PFL decreases by 16.53% (0.596 ± 0.02 standard units), and in women by 22.75% (0.550 ± 0.01 standard units). Thus, listening to contemporary youth music genres leads to a deterioration in the cardiorespiratory system and physical condition of the subjects. Rock music has the greatest negative impact compared to electronic music and rap.

Emotional tension is a key component of human adaptive behaviour. Anxiety is the most pronounced emotional reaction that arises when the balance between the human organism and the environment is disrupted. A state of anxiety (situational anxiety) manifests itself through individual emotions such as tension, restlessness and agitation. This is an emotional reaction to a change in familiar environmental conditions, a mismatch between a person's needs and the means to satisfy them, or an inability to cope with the demands of a specific situation. The level of situational anxiety varies depending on whether a person per-

ceives their surroundings as dangerous and threatening or assesses them as friendly and reliable.

The mean group score for situational anxiety (Table 2) among the young men before listening to music was 35.71 ± 1.14 points, which is classified as a 'moderate' level of anxiety. After listening to rap, although it remains within the 'moderate' range, it increased to 38.0 ± 0.86 points (a 6.4% increase from base-line); after listening to electronic music, it rises to 39.0 ± 1.43 points (an increase of 9.2% from the baseline), and after listening to rock music, to 43.14 ± 1.71 points (an increase of 20.8%).

Among young women, the baseline anxiety level is much higher than among young men, standing at 43.85 ± 0.77 points, situated on the borderline between 'moderate' and 'high' levels. After listening to rap, the group average anxiety score increased to 45.77 ± 0.69 points (by 4.4%), with the anxiety level becoming 'high'. After listening to electronic music, the anxiety level rises to 47.85 ± 0.85 points (by 9.1%); after listening to rock music, it reaches 52.92 ± 0.77 points, increasing by 20.7%.

Conclusions. The study thus demonstrated a deterioration in functional status (cardiorespiratory parameters) and an increase in situational anxiety among athletes aged 18–20 under the influence of contemporary youth music genres. Young people appear to be most vulnerable to the negative effects of rock music compared to electronic music and rap. The data obtained may be useful to teachers and staff at educational institutions in the field of physical education and sport when developing mental health recommendations for young people in education, with the aim of preventing anxiety in them; this, in turn, may help to strengthen the psychophysiological health of today's youth.



References

1. Bogdanov O.S., Kochetov N.V. K voprosu o transformatsii muzykalnoy subkultury i ee vliyaniya na sotsializatsiyu podrostkov. Sotsialnaya psikhologiya: Voprosy teorii i praktiki. Materialy V Vserossiyskoy nauchno-prakticheskoy konferentsii s mezhdunarodnym uchastiem pamyati M.Yu. Kondrateva. Moskva, 2020. Pp. 92-94.
2. Vikobroda A.D. Vliyaniye muzyki raznykh zhanrov na razvitiye i emotsionalnoye sostoyaniye cheloveka. Kulturnye trendy sovremennoy Rossii: ot natsionalnykh istokov k kulturnym innovatsiyam. Sbornik dokladov XII Vserossiyskoy nauchno-prakticheskoy konferentsii studentov, magistrantov, aspirantov i molodykh uchenykh. V 6-ti tomakh. Belgorod, 2024. Pp. 196-199.
3. Voronina A.D., Baranova E.M. Motivatsiya k samorazvitiyu predstaviteley molodezhnykh muzykalnykh subkultur. Sovremennyye problemy razvitiya professionalnogo obrazovaniya. Sbornik statey po materialam Vse-rossiyskoy nauchno-prakticheskoy konferentsii. Nizhniy Novgorod, 2024. Pp. 104-108.
4. Glazkova D.D. Sozidatelnoye i razrushitelnoye vozdeystviye muzyki na psikhoemotsionalnoye sostoyaniye podrostkov. Sovremennyye nauchnyye issledovaniya v sfere pedagogiki i psikhologii. Sbornik nauchnykh trudov Vserossiyskoy nauchno-prakticheskoy konferentsii. Kirov, 2025. Pp. 430-433.
5. Gustova A.A., Oprletaeva O.N. Formirovaniye muzykalnykh subkultur: filosofskiy analiz. Nauka. Novoye pokoleniye. Uspekhi. Materialy II Mezhdunarodnoy nauchno-prakticheskoy konferentsii. 2 tom. Krasnodar, 2021. Pp. 109-112.
6. Derikot V.A. RAP v istorii i kultury Rossii kontsa XX stoletiya: otrazheniye sotsialnykh protsessov razvitiya strany v prostranstve muzykalnogo tvorchestva i subkultury. Problemy sotsialnykh i gumanitarnykh nauk. 2020. No. 2(23). Pp. 37-42.
7. Zaytseva V.V., Nikolskaya K.V., Efremova T.A. et al. Vegetativnyye pokazateli studentov pri proslushivaniiy muzykalnykh stimulov razlichnykh zhanrov. Razvitiye sovremennoy molodezhnoy nauki: opyt teoreticheskogo i empericheskogo analiza. Sbornik statey II Mezhdunarodnoy nauchno-prakticheskoy konferentsii. Petrozavodsk, 2021. Pp. 213-218.
8. Zamaraev A.E. Vliyaniye razlichnykh zhanrov muzyki na izmeneniye funktsionalnogo sostoyaniya cheloveka. Mezhdistsiplinarnyye podkhody v biologii, meditsine i naukakh o Zemle: teoreticheskiye i prakticheskiye aspekty. Materialy simpoziuma XX mezhdunarodnoy nauchnoy konferentsii studentov, aspirantov i molodykh uchenykh. Kemerovo, 2025. Pp. 27-31.
9. Kapanyan N.N. Muzyka kak faktor sotsializatsii molodezhi. V sbornike: Nauka. Obrazovaniye. Kultura. Vklad molodykh issledovateley. Sbornik statey po materialam VI Mezhdunarodnoy nauchnoy konferentsii prepodavateley, aspirantov, magistrantov i studentov vuzov. Pod redaktsiye L.N. Sokolovoy. Novocherkassk, 2022. Pp. 172-175.
10. Karman E.K., Kononenko I.O. Vliyaniye proslushivaniya muzyki na pokazateli funktsionalnogo sostoyaniya cheloveka. Novosti mediko-biologicheskikh nauk. 2022. V. 22. No. 1. Pp. 52-53.
11. Kobzeva E.V. Ekstremiz v muzykalnykh subkulturakh. Molodezh-Barnaulu. Materialy XXV gorodskoy nauchno-prakticheskoy konferentsii molodykh uchenykh. Barnaul, 2024. Pp. 182.
12. Kolozov D.P. Konsolidiruyushchiy i akumuliruyushchiy potentsial molodezhnoy muzykalnoy kultury v sovremennykh realiyakh gosudarstvennoy molodezhnoy politiki v Krasnodarskom krae. Rossiyskiy politicheskii protsess v regionalnom izmerenii: istoriya, teoriya, praktika. 2023. No. 16. Pp. 52-59.
13. Knol Ya.E., Britik V.Yu. Rasprostraneniye tsennostey i idealov kriminalnoy subkultury sredi molodykh lyudey s pomoshchyu sovremennykh muzykalnykh zhanrov. Molodoy uchenyy. 2024. No. 47(546). Pp. 199-201.
14. Makarova S.N., Vozovikov S.G. Muzykalnaya molodezhnaya subkultura kak instrument sotsializatsii. Tvorcheskoye naslediye E.V. Ilenkova i sovremennost. 2022. No. 8. Pp. 68-76.
15. Marchik L.A., Nikitina E.O., Katalymov L.L. Kompleksnaya otsenka fizicheskoy rabotosposobnosti i funktsionalnogo sostoyaniya. Ulyanovsk: UIGPU, 2009. 181 p.
16. Parfenov M.R. Evolyutsiya muzykalnykh subkultur v Velikobritanii. Kultura i molodezh: poisk kulturnoy identichnosti. Materialy XLIX nauchno-tvorcheskoy konferentsii studentov SGIK, posvyashchennoy 50-letiyu Samarskogo gosudarstvennogo instituta kultury. Samara, 2021. Pp. 94-95.
17. Petelina E.A., Shemeneva M.V. Muzykalnaya



- subkultura kak element vospitaniya lichnosti shkolnika. *Sovremennoe khudozhestvennoe obrazovanie: teoriya i praktika. Materialy VI Vserossiyskoy nauchno-prakticheskoy konferentsii, posvyashchenoy godu pedagoga i nastavnika. Voronezh, 2023. Pp. 164-167.*
18. Pyanykh A.A. Fenomen sovremennykh muzykalnykh subkultur v otech-estvennom iskusstve. V sbornike: *Muzykalnaya kultura, pedagogika i obra-zovanie. Sbornik materialov shestogo vserossiyskogo s mezhdunarodnym uchastiem nauchnogo studencheskogo foruma fakulteta iskusstv. Kursk, 2020. Pp. 61-62.*
19. Troneva E.S., Boriskin N.A., Tretyakov R.I. Muzyka kak sredstvo optimi-zatsii funktsionalnogo sostoyaniya organizma. *Fizicheskaya kultura, sport i problemy zdorovogo obraza zhizni v sisteme meditsinskogo obrazovaniya. Sbornik materialov III Vserossiyskoy nauchno-prakticheskoy konferentsii s mezhdunarodnym uchastiem. Volgograd, 2025. Pp. 51-54.*
20. Khanin Yu.L. *Kratkoe rukovodstvo k shkale reaktivnoy i lichnostnoy tre-vozhnosti Ch.D. Spilbergera. Leningrad, 1976. 18 p.*
21. Chekalina A.I. Osobennosti vliyaniya muzyki na funktsionalnoe sostoyanie organizma cheloveka. *Materialy nauchnoy sessii. Volgograd, 2024. Pp. 459-462.*
22. Chekalina A.I., Semenov Ya.O., Sroslova G.A. Vliyanie muzyki na funktsionalnoe sostoyanie organizma lyudey v zavisimosti ot temperamenta. *Bekkerovskie chteniya. Materialy III Vserossiyskoy nauchno-prakticheskoy konferentsii. Volgograd, 2024. Pp. 190-193.*
23. Shlyakov A.V., Rebysheva L.V. *Sravnitelnyy analiz sotsiokulturnykh istokov rok muzyki v SSSR i SSHA. Izvestiya vysshikh uchebnykh zavedeniy. Sotsiologiya. Ekonomika. Politika. 2023. V. 16. No. 2. Pp. 99-111.*
24. Shumilin A.S. *Sovremennaya muzykalnaya subkultura. Filosofskie, sotsiologicheskie i psikhologo-pedagogicheskie problemy sovremennogo obrazovaniya. 2021. No. 3. Pp. 191-194.*
25. Shcherbin F.A., Shelkov M.V., Shcherbina A.F. et al. *Muzyka kak sredstvo korrektsii psikhoeemotsionalnogo sostoyaniya studentov. Fizicheskaya kultura, sport i zdorovesberezhenie: poisk, innovatsii i perspektivy razvitiya. Materialy II Mezhdunarodnoy nauchno-prakticheskoy konferentsii. Murmansk, 2021. Pp. 236-242.*
26. Vorotnikova Yu.S., Zhalyuk V.R. *Muzyka kak instrument snizheniya situativnoy trevozhnosti u podrostkov. Colloquium-journal. 2021. No. 7(94). Pp. 33-36.*
27. Nemova O.A., Svadbina T. V. *Muzykalnye predpochteniya sovremennoj molodezhi. Manusript. Tambov: Gramota, 2020. No. 5. Pp. 176-180. URL: <https://doi.org/10.30853/manuscript.2020.5.34>. (date of access: 25.02.2025).*
28. Raxmanina I.N., Ovsyannikova T.Yu., Tajsyaeva S.B. *Vliyanie funkcionalnoj muzyki na psixoemotsionalnoe sostoyanie podrostkov. Uchenye zapiski universiteta imeni P.F. Lesgafta, 2021. No. 5(195). Pp. 507-513.*