SPECIFICS OF THE DAILY TIME BUDGET OF VLADIVOSTOK HIGHER SCHOOL STUDENTS DURING THE COVID-19 PANDEMIC

Gritsina OP ✉, Yatsenko AK, Trankovskaya LV, Tarasenko GA, Istomin SD

Pacific State Medical University, Vladivostok, Russia

In 2020, the spread of the new coronavirus infection made the education system change significantly, the changes emergency by nature. This could not but affect lifestyle and health of students. This report presents the results of an investigation aimed at studying (hygienic assessment) the peculiarities of the daily time budget of Vladivostok students in the context of the COVID-19 pandemic. Six hundred and thirty four students (years 1 through 4, aged 18 through 24) filled the questionnaires and thus reported on their educational activity, sleep, physical activity, nutrition. It was found that smartphone was the favorite e-learning tool among the respondents, with 5.84±0.93% of them having it is the only means of communication. Distance learners, compared with those studying in-person, significantly more often exceeded hygienic recommendations prescribing time limitations for continuous work with a computer/laptop (39.39±2.21% versus 28.47±3.76% χ^2=5.69, p=0.018). Also, the former have significantly more often exceeded the 7-8 hour night sleep time (15.92±1.65% versus 6.94±2.12%, χ^2=7.49, p=0.007) ... It was established that among students studying online there were significantly fewer people eating once (9.8±1.34% versus 24.31±3.57%, χ^2=20.59, p<0.001) and shortly before sleep (52.24±2.26% versus 64.58±3.99%, χ^2=6.85, p=0.009). Distance learners significantly more often went for a walk than those who attended full-time classes (56.73±2.24% versus 29.86±3.81%, χ^2=8.32, p=0.004). Thus, distance learning allowed continuing the educational process itself, however, it changed the usual regimes and forced redistribution of the time costs.

Keywords: students, distance learning, electronic devices, lifestyle, physical activity

Author contribution: Research concept and design — Gritsina OP, Trankovskaya LV. Collection and processing of material — Gritsina OP, Yatsenko AK, Istomin SD. Statistical processing — Gritsina OP. Text writing — Gritsina OP, Yatsenko AK, Tarasenko GA. Editing — Gritsina OP, Yatsenko AK, Trankovskaya LV.

Compliance with ethical standards: Extract from the minutes of the meeting of the Interdisciplinary Ethics Committee № 9 dated May 29, 2020.

✉ **Correspondence should be addressed:** Olga P. Gritsina
Ostryakova Ave. 2, Vladivostok, 690002; g2010o@mail.ru

Received: 17.03.2021 **Accepted:** 25.03.2021 **Published online:** 30.03.2021

DOI: 10.24075/rbh.2021.005

ОСОБЕННОСТИ СУТОЧНОГО БЮДЖЕТА ВРЕМЕНИ ОБУЧАЮЩИХСЯ ВУЗОВ Г. ВЛАДИВОСТОКА В ПЕРИОД ПАНДЕМИИ COVID-19

О. П. Грицина ✉, А. К. Яценко, Л. В. Транковская, Г. А. Тарасенко, С. Д. Истомин

Тихоокеанский государственный медицинский университет, г. Владивосток, Россия

В 2020 г. в связи с распространением новой коронавирусной инфекции система образования претерпела существенные изменения, которые носили экстренный характер, что не могло не сказаться на образе жизни, а также, здоровье обучающихся. Представлены результаты исследования по гигиенической оценке особенностей суточного бюджета времени студентов Владивостока в условиях пандемии COVID-19. Методом анкетирования проведено изучение режима учебной деятельности, сна, двигательной активности, питания у 634 обучающихся 1–4 курсов в возрасте 18–24 года. Установлено, что излюбленным средством электронного обучения у респондентов был смартфон, а для 5,84±0,93% исследуемых он являлся единственным предметом коммуникации. Определено, что обучающиеся дистанционно значимо чаще превышали гигиенические рекомендации по продолжительности непрерывной работы с компьютером/ноутбуком, в сравнении со студентами, находящимися на традиционном обучении (39,39 ± 2,21% против 28,47 ± 3,76% χ^2 = 5,69, p = 0,018), а также значимо чаще превышали временной регламент ночного сна в 7–8 часов (15,92 ± 1,65% против 6,94 ± 2,12%, χ^2 = 7,49, p = 0,007). Определено, что среди студентов, находящихся на онлайн обучении, было значимо меньше людей, питающихся однократно (9,8 ± 1,34% против 24,31 ± 3,57%, χ^2 = 20,59, p < 0,001) и незадолго до сна (52,24 ± 2,26% против 64,58 ± 3,99%, χ^2 = 6,85, p = 0,009). Обнаружено, что обучающиеся дистанционно значимо чаще совершали прогулки, чем посещавшие занятия очно (56,73 ± 2,24% против 29,86 ± 3,81%, χ^2 = 8,32, p = 0,004). Итак, дистанционное образование позволило не прерывать учебный процесс, однако, способ образования сопровождался изменением привычных режимов и перераспределения временных затрат.

Ключевые слова: студенты, дистанционное обучение, электронные устройства, образ жизни, двигательная активность.

Вклад авторов: Концепция и дизайн исследования — О. П. Грицина, Л. В. Транковская. Сбор и обработка материала — О. П. Грицина, А. К. Яценко, С. Д. Истомин. Статистическая обработка — О. П. Грицина. Написание текста — О. П. Грицина, А. К. Яценко, Г. А. Тарасенко. Редактирование — О. П. Грицина, А. К. Яценко, Л. В. Транковская

Соблюдение этических стандартов: Выписка из протокола заседания Междисциплинарного комитета по этике № 9 от 29 мая 2020 г.

✉ **Для корреспонденции:** Грицина Ольга Павловна
пр-т Острякова, д. 2, г. Владивосток, 690002; g2010o@mail.ru

Статья получена: 17.03.2021 **Статья принята к печати:** 25.03.2021 **Опубликована онлайн:** 30.03.2021

DOI: 10.24075/rbh.2021.005

Modern society holds person as the most valuable entity, and person, human being, is the main beneficiary of the country's socio-economic growth and development. For every person, the necessary components of a full life are comfortable conditions of existence and the possibility of self-fulfillment, i.e., active and personal realization of one's creative, intellectual and spiritual potential. Therefore, one of the most acute problems in the world today is the creation of conditions for successful socialization and full-scale development of the younger generation in the context of its education. And, as is well known, improving the quality of education ensures a constant and sustainable improvement of mental and somatic health of the country's population. The health preservation skill should be trained in students at the higher school establishments they go to [1–5].

In March 2020, all subjects of the Russian Federation announced the self-isolation regime due to the spread of the

new coronavirus infection. As a result thereof, educational establishments switched to distance learning. In this connection, preservation of health of student youth became one of the most urgent tasks for the society. In today's world, with its lack of social, economic and political stability, this population group experiences the greatest negative effect from the environment and cannot always adapt to new, changed conditions of living, studying, and high mental stress. The studies conducted during this period show that the transition of universities to teaching and working with students online triggered emergence of innovative education provision methods and affected health of the future specialists. Thus, during the COVID-19 pandemic, health deterioration manifestations such as burnout syndrome, depression and anxiousness, as well as somatic symptoms, were identified in university students from different countries [6–12]. Such studies were never conducted in our region. The outlined circumstances determined the purpose and objectives of this study.

The purpose of this investigation was to study the daily time budget of Vladivostok higher school students during the COVID-19 pandemic.

MATERIALS AND METHODS

This was a prospective cohort study. A specially developed questionnaire was offered for filling to Vladivostok higher school students. The material was collected in October and November 2020. In total, 634 students of years 1 through 4 and ages 18 through 24 took part in the survey, 362 female and 272 male. The questionnaire contained questions about their patterns of educational activity, sleep, physical activity, nutrition. We analyzed the priority activities implying use of electronic means of communication (EMC) by students, the frequency and mode of use of various gadgets. The obtained data were processed applying the parametric and nonparametric analysis method. We calculated the mean values (M), standard errors of the mean (m), mean square (standard) deviations (σ), relative values (P), errors of relative values (mp); in the comparative analysis of the studied indicators, Student's t-test and Pearson's criterion χ^2 were used; to study the relationship of features, Pearson correlation test (r), Spearman rank-order correlation coefficient (R) were carried out and calculated. The study checked statistical significance of the obtained coefficients, indicating the achieved level of significance (p) and the actual value of the criterion. Statistical processing of the obtained materials relied on the Statistica 10.0 software package run under Windows 2010 operating system [13].

RESULTS

The analysis of educational activities showed that in this time period, students of Vladivostok universities studied relying on distance learning technologies (DLT). In this manner, 27.13±1.77% of respondents had a third of the classes relying on DLT, for 18.3±1.54% DLT enabled half of the disciplines, 17.03±1.49 had more distance lessons than in-person classes and 15.14±1.42% studied with the help of DLT exclusively. In-person classes only were given to 22.71±1.66% of the respondents.

To master the disciplines, the students used the following EMCs: computer — 29.34±1.81%, laptop — 44.32±1.97%, tablet — 12.78±1.33%, smartphone — 13.56±1.36 %. The duration of the use of gadgets for educational purposes was 3.89±1.17 hours. For students taking DL classes, this indicator was significantly higher than for those who attended in person (5.17±1.12 hours versus 2.08±0.97 hours, respectively, t=2.09, p=0.037).

At the same time, the study participants used gadgets not only for educational purposes. It was determined that the most popular (with the exception of use for educational purposes) type of activity enabled by EMCs among the respondents was communication in social networks (90.22±1.18%), followed by watching video and listening to music (72.24±1.78%), reading fiction (44.79±1.97%) and playing online computer games (18.61±1.55%). The EMC of choice was smartphone. Absolutely all university students used one every day for any purpose. It should be noted that only for 5.84±0.93% of the respondents a smartphone was the only means of communication, while the majority of respondents (63.56±1.91%) used another gadget on a daily basis, 19.09±1.56% had two devices and 11.51±1.27 — three gadgets. Table shows the preferences of respondents in choosing EMCs for various types of activities.

For survey participants, the total duration of use of various EMCs per day was 6.12±1.87 hours. However, a comparative analysis did not reveal significant differences in screen time between students studying with the help of DLTs and those studying in person (6.31±1.75 hours versus 5.34±1.49 hours, p>0.05). At the same time, it was established that distance learners, compared with those studying in-person, significantly more often exceeded hygienic recommendations prescribing time limitations for continuous work with a computer/laptop (39.39±2.21% versus 28.47±3.76% χ^2=5.69, p=0.018).

The average nighttime sleep duration among the students was registered at 6.94±1.41 hours. The duration of night sleep

Table. Preferences of Vladivostok higher school students in choosing EMCs for various types of activities

Electronic means of communication (EMC)	Number of students preferring EMCs by type of activity									
	Learning the educational material, preparing for classes		Social media communication		Watching movies, listening to music		Computer games		Reading fiction	
	Abs.	P ± m_p, %	Abs.	P ± m_p, %	Abs.	P ± m_p, %	Abs.	P ± m_p, %	Abs.	P ± m_p, %
Computer	186	29.34 ± 1.81	24	4.2 ± 0.84	56	12.23 ± 1.53	49	41.53 ± 4.54	no gadget was not used for this activity	
Laptop	281	44,32 ± 1.97	48	8.39 ± 1.36	247	53.92 ± 2.33	41	34.75 ± 4.38	no gadget was not used for this activity	
Tablet	81	12.78 ± 1.33	116	20.28 ± 1.68	63	13.76 ± 1.61	28	23.72 ± 3.92	164	57.75 ± 2.93
Smartphone	86	13.56 ± 1.36	384	67.13 ± 1.96	92	20.09 ± 1.87	no gadget was not used for this activity		72	25.35 ± 2.58
E-book	no gadget was not used for this activity		no gadget was not used for this activity		no gadget was not used for this activity		no gadget was not used for this activity		48	16.9 ± 2.22

was sufficient and amounted to 7–8 hours for 44.79±1.97% of students, 41.32±1.96% of the respondents slept less than 7 hours and 13.88±1.37% — more than 9 hours. Compared to the students taking full-time classes, students who studied remotely had significantly less often observed the nighttime sleep limit of 7–8 hours and significantly more often exceeded it (43.27±2.24% versus 52.78±4.16%, χ^2=4.06, p=0.04 and 15.92±1.65% versus 6.94±2.12%, χ^2=7.49, p=0.007, respectively).

It was established that 50.79±1.19% of survey participants had 3-4 meals a day every day, 36.12±1.91% had 2 meals and 13.09±1.39% ate once a day only. About half of the respondents (44.95±1.98%) had dinner less than 2 hours before bedtime, and 74.29±1.74% of the study participants regularly noted 5-6-hour pauses between meals. Comparative analysis revealed that among distance learners there were significantly fewer people eating once (9.8±1.34% versus 24.31±3.57%, χ^2=20.59, p<0.001) and shortly before sleep (52.24±2.26% versus 64.58±3.99%, χ^2=6.85, p=0.009).

Study participants stayed out in the fresh air for 2.21±0.37 hours every day. In 49.37±1.99% of cases, this stay was associated with the need to move to an educational institution and/or work. It was found that students relying on DLT significantly more often walked in the open than their peers who attended classes in person (56.73±2.24% versus 29.86±3.81%, χ^2=8.32, p=0.004). The motor activity of the interviewed students was 5482.98±240.27 steps per day.

Correlation test has shown a significant and direct link between the share of classes attended online and the general length of use of EMCs by the students (R=0.16, p=0.03), more specifically, use of EMCs for educational purposes (R=0.21, p=0.03), number of meals taken a day (R=0.18, p=0.01). Also, a significant inverse correlation was uncovered between the total gadget screen time and night sleep duration (r=–0.17, p = 0.02).

DISCUSSION

The results obtained are consistent with those reported by Russian and foreign scientists. In 2020, V.R. Kuchma et al. have studied the characteristics of life and well-being of 5–11 year schoolchildren in 79 regions of Russia, and found that during the distance learning period, they mainly relied on smartphones (73.1% of respondents), which consequently raised their continuous screen time [1]. A number of researchers have also pointed to the almost 2-fold growth of continuous screen time in the context of DLT application. Scientists noted that distance learning is associated with violations of the students' daily routines, in particular, their patterns of sleep and nutrition, which is also reflected in the data obtained through the present study [2, 3, 6]. A study in Iran showed that, compared to the working population of the country, medical students were significantly more stressed, anxious and depressed, which influenced quality of their night sleep and need for food [11]. Italian researchers surveyed the younger generation (18-35 years old) of the country's residents during the spread of the new coronavirus infection; they reported increased screen time before bed, longer night sleep, later awakening and poor quality of sleep. Some other daily routine violations noted were decreased physical activity, less time in the open air and, as a consequence, in sunlight [12]. Haider AS, Al-Salman S (2020), studying 775 Jordanian students during the COVID-19 pandemic, found that more than 80% of the respondents had their sleep deteriorating as a result of prolonged use of digital learning tools, and 90% of students reported fatigue associated with screen time, while 89% of the surveyed showed symptoms of nervousness and tension connected therewith. Seventy three percent of students do not recommend continuing with the online learning model, since it is socially and psychologically unhealthy [5].

Some foreign colleagues have studied the psychological and somatic health of students during the spread of the new coronavirus infection. Patricia A (2020) worked with the students of a US East Coast state university; she reported that during the online learning period, their motivation was going down, same as self-efficacy and cognitive activity, and this is against the background of all the students having free access to supportive academic resources and devices [10]. Indian students, when switched to distance learning, were seen developing such somatic symptoms as headaches, insomnia, digestive problems, hormonal imbalance and fatigue [9]. Bolatov AK et al (2020) surveyed students of medical universities in Kazakhstan and found that during the distance learning period they were less prone to burn out, get depressed or anxious compared to the in-person studying, but communicating online had a negative impact on interpersonal relations of students [4].

It should be noted that scientists from central Russia, Europe and Central Asia pointed to shorter open air time and, as a consequence thereof, decreased physical activity [1–4, 12], but in the capital of the Russian Far East we found that students, on the contrary, began to spend more time outside. Such differences may be explained by the fact that regions of the Russian Federation, with the exception of its European part, did not impose strict restrictions on outside movement, or have imposed such for only a short period.

The analyzed results of research efforts by Russian and foreign colleagues confirm the urgency of the problem and the need for further in-depth study thereof.

CONCLUSIONS

The data obtained allowed determining the time Vladivostok higher school students spend on studying, sleep, motor activity, nutrition during the COVID-19 pandemic. Significant differences of the listed factors were determined among students studying online and in-person. Also, we uncovered links between the share of curriculum delivered online and time spent on various components of the students' daily routine.

There is no doubt that the restrictions imposed to counter the disease have significantly affected life of every individual. Distance learning allowed keeping the educational process uninterrupted, despite the restrictions. However, this mode of provision of knowledge is associated with routine changes and reallocation of the time budget units, which is clearly demonstrated in this study. We consider it expedient to further study the effect of DLT on various aspects of life and health of students.

References

1. Kuchma VR, Sedova AS, Stepanova MI, Rapoport IK, Polenova MA, Sokolova SB et al. Life and wellbeing of children and adolescents studying remotely during the epidemic of a new coronavirus infection (COVID-19). Problems of school and university medicine

and health. 2020; 2: 4–23. Russian.
2. Popov VI, Milushkina OYu, Skoblina NA, Markelova SV, Sokolova NV, Dementev AA. Behavioral health risks for students during distance education. Hygiene and sanitation. 2020; 99(8): 854-860. Russian. https://doi.org/10.47470/0016-9900-2020-99-8-854-860 .
3. Popov VI, Milushkina OYu, Sudakov DV, Sudakov OV. Lifestyle and health characteristics of students during distance learning. Zdorov'e Naseleniya i Sreda Obitaniya. 2020; 11 (332): 14-21. https://doi.org/10.35627/2219-5238/2020-332-11-14-21.
4. Bolatov AK, Seisembekov TZ, Askarova AZ, Baikanova RK, Smailova DS, Fabbro E. Online-learning due to Covid-19 improved mental health among medical students. Med.Sci.Educ. 2020. https://doi.org/10.1007/s40670-020-01165-y.
5. Haider AS, Al-Salman S. Dataset of Jordanian University students' psychological health impacted by using e-learning tools during COVID-19. Data Brief. 2020: 106104. https://doi.org/10.1016/j.dib.2020.106104.
6. Bogomolova ES, Badeeva TV, Kotova NV, Maksimenko EO, Olyushina EA, Languev KA. Hygienic aspects of distance education. Problems of school and university medicine and health. 2020; 3: 35–38. Russian.
7. Milushkina OYu, Popov VI, Skoblina NA, Markelova SV, Sokolova NV. The use of electronic devices by students, parents and teachers before and after the transition to distance learning. Bulletin of RSMU. 2020; 3: 77–82. https://doi.org/10.24075/brsmu.2020.037. Russian.
8. Skoblina NA, Shpakou AI, Markelova SV, Obelevskiy AG, Kuznetsov OE. Subjective evaluation of effects of vision risk factors related to the use of electronic devices by students. Zdorov'e Naseleniya i Sreda Obitaniya. 2020; 4 (325): 48–51. https://doi.org/10.35627/2219-5238/2020-325-4-48-52.
9. Majumdar P, Biswas A, Sahu S. COVID-19 pandemic and lockdown: cause of sleep disruption, depression, somatic pain, and increased screen exposure of office workers and students of India, Chronobiology International. 2020; 8 (37): 1191–1200. https://doi.org/10.1080/07420528.2020.1786107.
10. Patricia A. College students' use and acceptance of emergency on-line learning due to COVID-19. Int J Educ Res Open. 2020: 100011. https://doi.org/10.1016/j.ijedro.2020.100011
11. Vahedian-Azimi A, Moayed MS, Rahimibashar F, Shojaei S, Ashtari S, Pourhoseingholi MA. Comparison of the severity of psychological distress among four groups of an Iranian population regarding COVID-19 pandemic. BMC Psychiatry. 2020: 402. https://doi.org/10.1186/s12888-020-02804-9
12. Cellini N, Canale N, Mioni G, Costa S. Changes in sleep pattern, sense of time and digital media use during COVID-19 lockdown in Italy. J Sleep Res. 2020: e13074. https://doi.org/10.1111/jsr.13074.
13. Minzhasova AI. Statistical analysis of medical data. Applied Mathematics and Fundamental Informatics. 2015; 2: 193–8.

Литература

1. Кучма В.Р., Седова А.С., Степанова М.И., Рапопорт И.К., Поленова М.А., Соколова С.Б. и др. Особенности жизнедеятельности и самочувствия детей и подростков, дистанционно обучающихся во время эпидемии новой коронавирусной инфекции (COVID-19). Вопросы школьной и университетской медицины и здоровья. 2020; 2: 4–23.
2. Попов В.И., Милушкина О.Ю., Скоблина Н.А., Маркелова С.В., Соколова Н.В., Дементьев А.А. Поведенческие риски здоровью студентов в период проведения дистанционного обучения. Гигиена и санитария. 2020; 99(8): 854-860. https://doi.org/10.47470/0016-9900-2020-99-8-854-860.
3. Попов В.И., Милушкина О.Ю., Судаков Д.В., Судаков О.В. Особенности образа жизни и здоровья студентов в период дистанционного обучения. Здоровье населения и среда обитания. 2020; 11 (332): 14-21. https://doi.org/10.35627/2219-5238/2020-332-11-14-21.
4. Bolatov AK, Seisembekov TZ, Askarova AZ, Baikanova RK, Smailova DS, Fabbro E. Online-learning due to Covid-19 improved mental health among medical students. Med.Sci.Educ. 2020. https://doi.org/10.1007/s40670-020-01165-y.
5. Haider AS, Al-Salman S. Dataset of Jordanian University students' psychological health impacted by using e-learning tools during COVID-19. Data Brief. 2020: 106104. https://doi.org/10.1016/j.dib.2020.106104.
6. Богомолова Е.С., Бадеева Т.В., Котова Н.В., Максименко Е.О., Олюшина Е.А., Лангуев К.А. Гигиенические аспекты дистанционного образования обучающихся. Вопросы школьной и университетской медицины и здоровья. 2020; 3: 35–38.
7. Милушкина О.Ю., Попов В.И., Скоблина Н.А., Маркелова С.В., Соколова Н.В. Использование электронных устройств участниками образовательного процесса при традиционной и дистанционной формах обучения. Вестник Российского государственного медицинского университета. 2020; 3: 85–91. https://doi.org/10.24075/vrgmu.2020.037.
8. Скоблина Н.А., Шпаков А.И., Маркелова С.В., Обелевский А.Г., Кузнецов О.Е. Субъективная оценка студентами влияния факторов риска на зрение при использовании электронных устройств. Здоровье населения и среда обитания. 2020; 4 (325): 48-51. https://doi.org/10.35627/2219-5238/2020-325-4-48–52.
9. Majumdar P, Biswas A, Sahu S. COVID-19 pandemic and lockdown: cause of sleep disruption, depression, somatic pain, and increased screen exposure of office workers and students of India, Chronobiology International. 2020; 8 (37): 1191–1200. https://doi.org/10.1080/07420528.2020.1786107.
10. Patricia A. College students' use and acceptance of emergency on-line learning due to COVID-19. Int J Educ Res Open. 2020: 100011. https://doi.org/10.1016/j.ijedro.2020.100011
11. Vahedian-Azimi A, Moayed MS, Rahimibashar F, Shojaei S, Ashtari S, Pourhoseingholi MA. Comparison of the severity of psychological distress among four groups of an Iranian population regarding COVID-19 pandemic. BMC Psychiatry. 2020: 402. https://doi.org/10.1186/s12888-020-02804-9
12. Cellini N, Canale N, Mioni G, Costa S. Changes in sleep pattern, sense of time and digital media use during COVID-19 lockdown in Italy. J Sleep Res. 2020: e13074. https://doi.org/10.1111/jsr.13074
13. Минжасова А. И. Статистический анализ медицинских данных. Прикладная математика и фундаментальная информатика. 2015; 2: 193–8.