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Relationship between students physical activity level and self-perceived health status

Povezanost razine tjelesne aktivnosti i subjektivne procjene zdravlja studentica

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Summary

Aims: To establish the level of physical activity of female students from Zadar University and the relationship between their established level of physical activity and subjective assessment of health.

Methods: Survey data collection was conducted on a sample of 312 female students from the University of Zadar with the average age 21.68 and standard deviation 1.54 years. Physical activity level was assessed using the International Physical Activity Questionnaire – long form. Four domains of physical activity and the total physical activity were calculated based on the items of the International Physical Activity questionnaire. The total score of physical activity level was calculated by summing the activity in four domains: work-related physical activity, transport-related physical activity, domestic physical activity and leisure-time physical activity. Self-perceived health status was assessed using the Medical Outcomes Study Short Forms Questionnaire. Eight subscales of health status were calculated based on the items of the Questionnaire.

Results: The student's median total physical activity was 64.75 MET-hour/week, and the highest energy consumption was achieved in the domestic physical activity domain (16.17 MET-hour/weeks). The results indicate that the level of physical activity is associated with some subjective indicators of health. The largest positive correlation was obtained for the total physical activity and mental health, while the physical activity at work and domestic physical activity were negatively associated with some components of health. Better student's mental health and vitality contributes to higher physical activity in leisure-time.

Conclusion: The main conclusion of the research indicates the existence of a statistically significant correlation between the level of physical activity of female students and their subjective assessment of certain components of health status. The evidence on the positive relationship of physical activity with health indicators can potentially be used to support evidence-based promotion of physical activity in a university setting, and as a hypothesis for future longitudinal studies on such potential causal relationships.

Key words: correlation; health status; promotion of physical activity; students

Sažetak

Cilj: Utvrditi razinu tjelesne aktivnosti studentica Sveučilišta u Zadru, te povezanost njihove razine tjelesne aktivnosti i subjektivne procjene zdravlja.

Metode: U svrhu prikupljanja podataka provedeno je anketiranje na prigodnom uzorku 312 zadarskih studentica, prosječne dobi 21,68 godina i standardne devijacije 1,54 godina. Za procjenu razine tjelesne aktivnosti korišten je Međunarodni upitnik tjelesne aktivnosti – duga verzija. Četiri domene tjelesne aktivnosti i ukupna razina tjelesne aktivnosti izračunate su na osnovu čestica Međunarodnog upitnika tjelesne aktivnosti – duge verzije. Ukupna razine tjelesne aktivnosti izračunata je zbrajanjem tjelesne aktivnosti u sve četiri domene: tjelesne aktivnosti na poslu, tjelesne aktivnosti vezane uz prijevoz/transport, tjelesne aktivnosti vezane uz kućanstvo i tjelesne aktivnosti u slobodno vrijeme. Samoprocjena zdravstvenoga statusa izvršena je primjenom Upitnika za subjektivnu procjenu zdravstvenoga statusa – zdravstvena anketa. Osam subskala zdravstvenoga statusa izračunato je na temelju čestica Upitnika.

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Rezultati: Medijan ukupne razine tjelesne aktivnosti studentica iznosi 64,75 MET-sat/tjedan, a najviša energetska potrošnja ostvaruje se u domeni tjelesne aktivnosti u kućanstvu (16,17 MET-sat/tjedan). Razina tjelesne aktivnosti povezana je s nekim subjektivnim pokazateljima zdravlja, a najveća pozitivna povezanost dobivena je za ukupnu tjelesnu aktivnost i mentalno zdravlje, dok je tjelesna aktivnost na poslu i u kućanstvu negativno povezana s nekim sastavnicama zdravlja. Boljem mentalnom zdravlju i vitalnosti doprinosi veća tjelesna aktivnost u slobodno vrijeme.

Zaključak: Glavni zaključak istraživanja ukazuje na postojanje statistički značajne povezanosti između razine tjelesne aktivnosti studentica i njihove subjektivne procjene određenih sastavnica zdravstvenoga statusa. Dokazi o pozitivnoj vezi tjelesne aktivnosti s pokazateljima zdravstvenoga statusa mogu se potencijalno koristiti za znanstveno utemeljenu promociju tjelesne aktivnosti u sveučilišnom okruženju i kao hipoteza za buduća longitudinalna istraživanja u kojima će se proučavati potencijalna povezanost.

Ključne riječi: povezanost; promicanje tjelesne aktivnosti; studenti; zdravstveni status

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Introduction

Physical activity (PA) is one of the basic functions of the human body. According to Caspersen[1] physical activity is defined as "any force exerted by skeletal muscles that results in energy expenditure above resting level". According to the definition of the World Health Organisation, health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.[2] There are two main concepts of health: physical and mental. Physical activity plays an essential role in the health status of an individual, regardless of whether this implies its physical or mental component. There is an abundance of evidence of the effectiveness of regular physical activity for the primary and secondary prevention of a group of chronic diseases (e.g. cardiovascular disease, diabetes, cancer, hypertension, obesity, depression, and osteoporosis)[3] and the prevention of premature mortality.[4] Increasing physical activity is a key component of the guidelines for reducing morbidity and mortality rates.[5] The World Health Organisation recommends adults to do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate and vigorous intensity activity.[2] Implementing the recommendations on the physical activity level enables the preservation and improvement of health by maintaining and reducing the decline in motor and functional abilities, which has a positive effect on the quality of life.[6] The relationship between physical activity and appropriate health status, viewed from different perspectives, has been the subject of the physical activity epidemiology study,[7] and the study suggests a positive relationship between the frequency of physical activity and subjective health assessment.[8] Furthermore, the existence of a link between physical activity and health status was found, according to which a further increase in the existing level of physical activity or physical fitness leads to a further improvement in the health status.[9] An inverse proportion has been found between the physical activity volume and total mortality rate, according to which an increase in the volume of physical activity reduces the total mortality rate.[10]

The purpose of this study was to establish the level of physical activity of female students and the relationship between the established level of physical activity and their subjective assessment of health. The results obtained in the research could contribute to a better understanding of the factors that are connected to students' health status and possibly have an effect on the promotion of programs aimed at increasing the level of physical activity of the student population.

Methods

The population included in the study was defined of female students of the University of Zadar aged 19 to 26 years. It included 312 participants (202 female students of the Department of Elementary School Teacher Education and 110 female students of the Department of Preschool Teacher Education). Prior to the implementation of the survey, the students were explained the purpose of the study and given full instructions for completing the questionnaire, and they provided their voluntary consent to participate in the study that was conducted in accordance with the ethical principles of scientific research. The study had been approved by the Committee for Scientific Work and Ethics of the Faculty of Kinesiology, University of Zagreb.

The sample of variables consists of four domains of physical activity and the total physical activity calculated based on the particles of the International Physical Activity Questionnaire,[11] and eight scales calculated based on the particles of the Subjective Health Status Assessment Questionnaire – Health Survey.[12,13,14] Central and dispersive parameters were calculated: arithmetic mean (AM), standard deviation (SD), i.e. median (ME), and lower and upper quartile

(LU-quartile), minimum (MIN), maximum (MAX), and curvature (KURT) and asymmetry (SKEW) of distribution. The variable distribution normality was tested using the Kolmogorov-Smirnov test. The total physical activity level and physical activity level by domains were established according to the instructions for data processing (http/www.ipaq.ki.se/ipaq.htm). The subjective health assessment of female students was established according to the instructions for data processing (http/www.sf-36.org/tools/sf36.shtml). A high score on the Physical functioning scale indicates a high ability to perform physical activities, and a lower score indicates a lower ability to perform physical activities. A high score on the role of physical limitation scale indicates the absence of the problems concerning everyday activites due to good physical health. The physical pain scale indicates the presence of physical pain and limitations in performing activities due to physical pain. A high score on this scale indicates the absence of physical pain, and thus fewer limitations for performing activities. The general health scale indicates a person's general feeling about their own health, and a high score indicates that the person assesses their health as excellent. Low score on the vitality scale indicates a frequent feeling of fatigue and exhaustion. The social functioning scale refers to the limitations when performing regular social activities (socialising with friends, relatives, etc.). A low score on this scale indicates the existence of emotional or physical disturbances in the performance of social activities, and a high score indicates that individuals realise their social engagement without limitations. The role of the emotional limitation scale assesses emotional difficulties that have a limiting effect on the performance of daily physical activities. A high score on the scale indicates the absence of emotional problems when working or performing other regular activities. The mental health scale indicates the presence of the feelings of happiness, contentment and calmness, i.e. depression and nervousness. A high score indicates better mental health, and a lower one indicates the existence of some psychological problems.

The relationship between total physical activity and physical activity by domains with scales of subjective health assessment is expressed by the Spearman correlation coefficients. Data were processed by the STATISTICA software package, version 7.1., StatSoft, Inc.

Results

The results showed ($p < 0.01$) that the distributions of scores in the domains of physical activity (except for the work[b] domain, calculated only for those students who work) and the total physical activity levels deviate significantly from the normal distribution and are positive, asymmetric and leptokurtic to varying degrees (Table 1).

The median total physical activity level of female students is 64.75 MET-hours/week (Table 1), which is approximately 3.23 hours of moderate-intensity activity (4 MET units) five days per week, i.e. 1.62 hours of high-intensity physical activity (8 MET units) five days per week or an equivalent combination of moderate- and high- intensity activity. The lower quartile of the total physical activity level among female students of the University of Zadar is 36 MET-hours/week and the upper is 115.18 MET-hours/week (Table 1).

The median physical activity at work is shown on the total sample (work[a]) and on female students who were working or did some unpaid work (work[b]) at the time of the survey. In the total sample, the median physical activity at work is 0, which is not surprising considering that 84.29% of the students in this study stated that they were not employed. The median physical activity at work for the students who stated that they were doing some paid or unpaid work at the time of the study (15.71% of the total sample) is 63.60 MET-hours/week which is approximately 3.18 hours of moderate-intensity activity five days per week or 2 hours of high-intensity activity per week. In the total sample, a part of the students were professionally active athletes who trained for two hours a day five days a week on average, which corresponded to the stated median value of the physical activity at work.

The median physical activity obtained in the household chores domain is 16.17 MET-hours/week, which corresponded to approximately one hour of high-intensity physical activity in the household five days per week.

The values of median physical activity in leisure time and in transport are similar and amount to 14.69 MET-hours/week in leisure time and 14.39 MET-hours/week in transport. In accordance with the median value, students spend approximately 0.61 hours of high-intensity physical activity in the leisure time domain (e.g. 37 minutes of an intensive fitness programme) or 1.22 hours of moderate-intensity activity three times per week (e.g. 75 minutes of yoga). If the activities are distributed over five days per week, then this is approximately 45 minutes of moderate-intensity activity. In accordance with the median value of physical activity in transport, female students walk at a slow pace for approximately more than an hour five days per week or ride a bicycle for half an hour five days a week at a moderate intensity.

Table 1 Descriptive parameters of the domains of physical activity and total physical activity of female students
Tablica 1. Deskriptivni parametri domena tjelesne aktivnosti i ukupne tjelesne aktivnosti studentica

PA domains Domena TA	Median *Median*	LU-quartile *DG-kvartil*	Skewness *Zakrivljenost*	Kurtosis *Spljoštenost*	Max D *Max D*	K-S *K-S*
Work[a] *Posao*[a]	0.00	0.00 – 0.00	3.51	12.03	0.47	p < .01*
Work[b] *Posao*[b]	63.60	24.00 – 149.5	0.60	-0.88	0.14	p > .20
Transport *Prijevoz*	14.39	6.60 – 23.75	1.68	4.00	0.19	p < .01*
Household *Kućanstvo*	16.17	8.00 – 32.25	2.39	6.76	0.19	p < .01*
Leisure time *Slobodno vrijeme*	14.69	4.95 – 35.20	2.70	9.75	0.21	p < .01*
TOTAL PA *UKUPNA TA*	64.75	36.00 – 115.18	1.73	3.51	0.17	p < .01*

Legend: PA – physical activity;*TA- tjelesna aktivnost*; LU-quartile – lower and upper quartile, *DG-kvartil – donji I gornji kvartil*; Max D – largest deviation of the empirical from the theoretical relative cumulative frequency; *Max D – najveće odstupanje empirijske od teorijske relativne kumulativne frekvencije*; K-S – significance level of the Kolmogorov-Smirnov Test, *K-S – nivo značajnosti Kolmogorov-Smirnov testa*; [a] – parameters describing the physical activity level for the total sample, [a] – *parametri koji opisuju razinu tjelesne aktivnosti za ukupni uzorak*; [b] – parameters describing the physical activity level were calculated based on the data of the participants who were employed or doing some unpaid work at the time of the test (N = 49), while the results of other participants were not included in the analysis; [b] – *parametri koji opisuju razinu tjelesne aktivnosti izračunati su na temelju podataka sudionika koji su u trenutku ispitivanja zaposleni ili obavljaju neki neplaćeni posao (N = 49), dok rezultati drugih sudionika nisu uključeni u analizu*; * – indicates a statistically significant deviation at the level of 0.01

Among the eight health scales for students of the University of Zadar, the highest average was established for the role of physical limitation scale and amounts to 88.33 (Table 2), which refers to problems with work or other daily tasks they were unable to perform to a given extent due to impaired physical health. The score on the physical functioning scale is also high and amounts to 79.49. The score obtained on the social functioning scale is 78.08, which indicates the existence of obstacles that limit students to a lesser extent in conducting social activities. The obtained score on the role of emotional limitation scale (71.05) indicates the existence of emotional problems that limit students in performing daily activities. When sorted by score, the scales of general health, physical pain and mental health follow. The score of general health scale was 68.52. The score on physical pain scale (67.78) indicates the existence of physical pain in students, which also limits them in performing physical activities. The score of the students on the mental health scale was 66.68 which indicates the occurrence of minor psychological problems. The worst score was recorded on the vitality scale, and it amounted to 59.01, indicating that students were often not "full of energy and life" (Table 2).

Table 3 shows the Spearman correlation coefficients between the total physical activity level and the physical activity level by domains with eight scales of subjective health assessment. The total physical activity statistically significantly positively correlates to the mental health scale (Spearman correlation coefficient is 0.12). Physical activity in leisure time statistically significantly positively correlates to the scales of physical functioning, physical pain, and vitality. Physical activity in household statistically significantly negatively correlates with the role of the physical limitation scale. Physical activity in transport statistically significantly positively correlates with the scales of physical functioning and vitality. Physical activity at work does not correlate statistically significantly with any scale. All obtained correlations are statistically significant, but not large and range from 0.11 to 0.17 (Table 3).

Table 2. Descriptive parameters of subscales of subjective assessment of students' health
Tablica 2 Deskriptivni parametri subskala subjektivne procjene zdravlja studentica

Subcales *Subskale*	AM *AS*	SD *SD*	Skew. *Zakriv.*	Kurt. *Spljoš.*	Max D *Max D*	K-S *K-S*
Physical functioning *Tjelesno funkcioniranje*	79.49	24.65	-1.26	0.37	0.24	p < .01*
Role of physical limitation *Uloga tjelesnog ograničenja*	81.33	30.31	-1.56	1.30	0.38	p < .01*
Physical pain *Tjelesna bol*	67.78	23.32	-0.35	-0.53	0.11	p < .01*
General health *Opće zdravlje*	68.52	16.43	-0.56	0.20	0.11	p < .01*
Vitality *Vitalnost*	59.01	14.78	-0.53	0.43	0.12	p < .01*
Social functioning *Socijalno funkcioniranje*	78.08	18.48	-0.72	0.27	0.17	p < .01*
Role of emotional limitation *Uloga emocionalnog ograničenja*	71.05	37.88	-0.95	-0.64	0.33	p < .01*
Mental health *Mentalno zdravlje*	66.68	14.46	-0.80	0.57	0.14	p < .01*

Legend: AM – arithmetic mean; *AS – aritmetička sredina*; SD – standard deviation; *SD – standradna devijacija*; Skew. – skewness of distribution; *Zakriv. – zakrivljenost distribucije*; Kurt. – kurtosis of distribution; *Spljoš. – spljoštenost distribucije*; Max D – largest deviation of the empirical from the theoretical relative cumulative frequency; *Max D – najveće odstupanje empirijske od teorijske relativne kumulativne frekvencije*; K-S – significance level of the Kolmogorov-Smirnov test; *K-S-nivo značajnosti Kolmogorov-Smirnov testa*; * – statistically significant deviation from normal distribution; * *označava statistički značajno odstupanje na razini 0,01*

Table 3 Correlation between the total level and domains of physical activity with the subscales of subjective health assessment
Tablica 3 Povezanost ukupne razine i domena tjelesne aktivnosti sa subskalama subjektivne procjene zdravlja

Subscales *Subskale*	PAwork *TA posao*	PA transport *TA prijevoz*	PAhousehold *TA kućanstvo*	PA leisure time *TA slobodno vrijeme*	TOTAL PA *UKUPNA TA*
Physical functioning *Tjelesno funkcioniranje*	-0.08	0.15*	-0.04	0.11*	0.01
Role of physical limitation *Uloga tjelesnog ograničenja*	-0.02	0.07	-0.17*	0.10	-0.03
Physical pain *Tjelesna bol*	0.02	0.05	-0.11	0.13*	0.02
General health *Opće zdravlje*	-0.06	0.05	-0.05	0.07	-0.01
Vitality *Vitalnost*	-0.03	0.11*	-0.01	0.13*	0.06
Social functioning *Socijalno funkcioniranje*	-0.08	0.03	-0.06	0.03	-0.05
Role of emotional limitation *Uloga emocionalnog ograničenja*	0.00	-0.01	-0.01	0.04	0.04
Mental health *Mentalno zdravlje*	0.01	0.07	0.10	0.09	0.12*

Legend: PA – physical activity; *TA – tjelesna aktivnost*; * – indicates a statistically significant correlation on the significance level p < 0; * *– označava statistički značajnu korelaciju na nivou značajnosti p < 0*

Discussion

The obtained results of the total physical activity level of the female students in Zadar are very similar to the results of the total physical activity level obtained for the general population of female adults in the Republic of Croatia,[15] which amounted to 67.35 MET-hours/week. The aforementioned, obtained from female students in Zadar, is in line with the present knowledge on the physical activity level of students, which is stated to be not higher than the level of general population.[16] In relation to the general female population, the female students were more active in the work domain (measured on those who work), transport and leisure, while they were less active in the household domain. The higher physical activity level in the transport domain among female students compared to the general female population can be explained by the fact that the female students, given their financial abilities, do not own a car or some other motor vehicle, so they use the physically "active" forms of transport. Furthermore, female students have more free time, so the level of physical activity in this domain is higher. In addition, the type of work that female students perform compared to the sedentary type of work of the adult female population is of higher intensity (often it implies professional sport or similar), which leads to a higher level of physical activity of female students at work. The median total physical activity level for female students of the University of Zagreb[17,18] is lower than for the female students of the University of Zadar. The possible reason for the higher score of the total physical activity level of the students in Zadar compared to Zagreb can be attributed to the different geographical position, which results in different climatic conditions. Regional differences in the share of insufficiently active women were obtained as part of the Croatian Health Survey from 2003 and indicate that the city of Zagreb is in the lead among both women and men, so it can be assumed, analogously to these results, that students in the region of the city of Zagreb will also achieve lower scores among the student population. The results of a study conducted on students in Turkey[19] indicate that the median total physical activity level for female students of the Faculty of Kinesiology is 71.98 MET-hours/week, and female students of other departments 21.2 MET-hours/week.[28] Compared to these results, the female students of the University of Zadar achieve a higher total physical activity level compared to the students of other departments in Turkey, and a lower level compared to the students of the Faculty of Kinesiology. Students of the Faculty of Kinesiology are a specific subgroup that is expected to have a higher physical activity level considering their curriculum and future occupation. The higher score of the students of the Department of Teacher and Preschool Teacher Education in Zadar compared to students of other departments in Turkey may be the result of the curriculum, considering that the courses in the curriculum for the teacher and preschool teacher education study programme include thematic units that are related to the positive effects of physical activity on health. Among female students in Zadar, the highest median physical activity was obtained in the household domain. A similar result was also obtained by Jurakić[15] on the Croatian sample of middle-aged female employees, which leads to the conclusion that the acquired habits related to household chores during the student period are transferred later to middle adulthood. Furthermore, previous studies show that in less developed countries, the physical activity level in the domain of work, household chores and active transport contributes more to total physical activity.[20]

The female students in Zadar achieve lower physical activity levels in the field of leisure time and transport domain compared to the household chores domain. A smaller share of physical activity in the transport and leisure time domains in the total physical activity level compared to the household chores domain was obtained in the study conducted on the general Croatian population.[21] It is desirable to increase the physical activity of female students in their leisure time and in transport, in order to enlarge the positive effects on their health. The season and the semester in which the study was conducted might also be a reason for the lower median values in the leisure time and transport domains. A higher physical activity level of students was recorded in the summer semester compared to the winter semester.[22,23] Considering that the female students as part of the group that are assumed to acquire a higher level of education, it is troubling that their physical activity level in leisure time is relatively low, which is not in line with the findings of previous studies. In a study conducted in 15 European countries, it was found that there is a lower frequency of physical activity in leisure time in groups with lower levels of education compared to the group with a higher level of education.[24] Similar was found in the study by Mäkinen et al., (2012), which included 12 European countries in which the authors state that physical activity in leisure time is more frequent among participants with a higher level of education,[25] but it must be emphasized that in this study, the level of physical activity was assessed only for leisure-time physical activity. Also, one of the reasons why students from Zadar are less physically active is the lower economic development of Croatia compared to other

European countries. Students of the University of Zadar have a lower physical activity level in transport compared to students of the Faculty of Humanities and Social Sciences in Zagreb,[26] but they are more active in the household domain. The female students in Zadar are more active in their leisure time, and they have a higher total physical activity level compared to female students of the Faculty of Humanities and Social Sciences in Zagreb. In both of these researches for assessing physical activity level the International Physical Activity Questionnaire (IPAQ) was used, in this way it was possible to compare the obtained results.

Although the obtained median values of the total physical activity level of female students in Zadar are higher than the median values obtained in the study of female students in Zagreb,[17,18] there is room for improving the physical activity level in leisure time and transport by using "active" forms of transport.

The high score on the role of physical limitation scale obtained in the study on the female students in Zadar and the obtained score on the scale of physical functioning is very similar to the score achieved by students of the University of Zagreb[27] and middle-aged female employees in Croatia.[15] It is evident that female students in Zadar have some physical limitations that prevent them from performing their daily tasks. Compared to the general population aged eighteen to twenty four,[28] female students in Zadar have fewer limitations when performing normal social activities, but it must be highlighted that these surveys included two different samples of respondents; general population include students and all the other working and non working population.

The obtained score on the scale of the role of emotional limitations indicates the existence of emotional problems that limit female students in performing daily activities, but the scores are somewhat more favourable compared to the students in Zagreb,[27] and worse when compared middle-aged employees in Croatia.[15] An approximately similar result indicating the role of emotional limitation was obtained from the general population in Croatia.[28]

The female students in Zadar assess their general health better compared to the middle-aged female employees in Croatia,[15] and worse compared to the female students in Zagreb.[27]

The obtained result on the scale of physical pain is worse compared to students in Zagreb[27] and middle-aged female employees in Croatia,[15] and more favourable compared to the general population.[28] The existence of health problems or physical pain is also present in students of the University of Split.[29] The largest percentage of these students lists pain in the neck and lumbar spine area as the most common health problem. Apart from this, a large percentage of them have low blood pressure. Physical pain in female students in Zadar can be associated with the fact that they perform the vast majority of their obligations in a sitting position, which causes the said problems.

The result on the mental health scale is approximately similar to the score obtained from students in Zagreb[27]and middle-aged employees in Croatia.[15] Female students in Zadar feel better mentally compared to female students in Zagreb,[27] and the general population of the Republic of Croatia.[28] The authors Rakovac et al., attribute the worse score of the female students in Zagreb on this scale to the nervousness of female students, which is the result of the time in which the survey was conducted (exam period).[27]

A worse score on the vitality scale is expected given the lower score on the mental health scale. The vitality score of students from Zadar is very similar to that obtained for Zagreb students[30] and almost identical to the result of middle-aged employees,[15] while it is more favourable compared to the general population of the Republic of Croatia.[28] In a study conducted on students of the University of Split,[29] the results obtained indicate that female students point that the presence of frequent fatigue (52%) and general lack of time (43.9%) is the main cause of psychosomatic disturbances, in addition, a significant percentage (39.7%) of female students often feel tension, and a large part of them (23.9%) sleep worse and feel restless (24.2%). The authors attribute such results (feeling of tension, poor sleep and feeling of restlessness) to the inability of female students to achieve their goals during their studies, and the disorders mentioned by students (i.e. frequent fatigue) are a limiting factor of psychophysical ability necessary to achieve different goals. It can be assumed that students from Zadar also feel tired and exhausted, which (analogous to the previously mentioned research) can be associated with a large range of student obligations.

Female students from Zadar University achieve better results on their mental health scale, and worse on their scales of physical functioning, physical pain and general health. The results of research conducted in Croatia[31] indicated that there exist regional differences in subjective health assessment; in the Eastern region there are the lowest or among the lowest results of self-assessed health (both physical and mental aspect) compared to other regions. Results obtained for the Southern region of Croatia indicate that the respondents of that region assess their health better on all scales (except the perception of general health) in relation to the Zagreb region. If we compare the results from Zadar and the results from Australia[30] it is evident that Australian students have less problems concerning

everyday activities due to good physical health, higher ability to perform physical activities, less emotional problems, feel less physical pain and have better mental health than students from Zadar. Similar to the students from Zadar, they rate their general health and vitality. It is important to point up that Australia is an economically more developed country than Croatia, and countries with better economic status make more efforts to improve the health of the population. Their government strategies, directed towards a better quality of life, include programs for increasing the level of the population's physical activity. Students from Brasil[32] have less physical limitations and higher ability to perform daily activities, feel less pain than students from Zadar, but they indicate the feeling of fatigue. The reason for the differences in these two studies might be in the fact that research conducted on Brazilian students included only medical students. Brazilian students rate their mental health similar to students from Zadar. Iranian students[33] have more physical limitations and emotional problems, lower mental health and indicate frequent feelings of exhaustion compared to students from Zadar. Jordan[34] students have more physical limitations and limitations in performing social activities, feel more physical pain, have lower mental health and a lower score on the vitality scale compared to students from Zadar. The differences between Zadar and Iranian and Jordanian students are probably due to existing socio-cultural differences that occur between these nations.

From the obtained results, it can be concluded that female students who achieve a higher overall level of physical activity assess their mental health as better. Furthermore, students who achieve a higher level of physical activity in the field of free time have a higher ability to perform everyday physical activities, are not tired and exhausted but, on the contrary, are full of "energy and life" and have less physical pain that could interfere with daily activities. Moreovere, female students who achieve a higher level of physical activity in the household have some physical limitations in performing daily activities. In addition, female students who are more physically active in transport, perform physical activities in a better way, and they feel "energetic" completing physical activities.

Conclusion

To conclude, the overall level of physical activity of Zadar female students is satisfactory, the recommendation is to increase the level of physical activity in leisure time and in transport. Furthermore, Zadar female students assess their general health as good. Also, it can be concluded that female students with higher levels of physical activity have better mental health, perform better daily physical activities, feel more vital and have less physical pain. The importance of this research is manifested in obtaining information on the current level of physical activity and the health status of the student population. The obtained results can influence the promotion of programs aimed at increasing the level of physical activity of the student population. Future research should examine more potential protective factors that may enhance student's health status in order to get the best possible insight into health-related quality of life among the university student population.

Reference

1. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: definitions and distinctions for health related research. Public Health Rep 1985;100:126-31.
2. World Health Organization (WHO). Global Strategy on Diet, Physical Activity and Health. Physical Activity and Adults, Recommended levels of physical activity for adults aged 18 – 64 years. Accessible at the address: http://www.who.int/dietphysicalactivity/factsheet_adults/e. Date accessed: January 15, 2021
3. Warburton DER, Nicol CW, Bredin SSD. Health benefits of physical activity: the evidence. CMAJ 2006; 174:801-9.
4. Samitz G, Egger M, Zwahlen M. Domains of physical activity and all-cause mortality: systematic review and dose-response meta-analysis of cohort studies. Int J Epidemiol 2011;40:1382-1400.
5. Haskell WL, Lee IM, Pate RR, et al. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. Med Sci Sports Exerc 2007;39:1423-34.
6. Berger BG, Tobar D. Physical activity and quality of life. In: Tenenbaum G, Eklund RC, Eds. Handbook of sport psychology. 3rd ed. Hoboken: Wiley, 2007;598-620.
7. Welk GJ. Physical activity assessment for health-related research. Camphaing, Human Kinetics, 2002:157.
8. Olchowski AE, Graham JW, Beverly EA. Cigarette smoking, physical activity, and the health status of college students. J Appl Soc Psychol 2009;39:683-706.
9. Warburton DER, Nicol CW, Bredin SSD. Prescribing exercise as preventive therapy. CMAJ 2006;174:961-74.
10. Lee IM, Skerrett PJ. Physical activity and all-cause mortality: what is the dose-response relation? Med Sci Sports Exerc 2001;33(6 Suppl):S459-71; discussion S493-4.
11. Craig CL, Marshall AL, Sjöström M, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc 2003;35:1381-95.
12. Gandek B, Sinclair SJ, Kosinski M, Ware JE Jr. Psychometric evaluation of the SF-36 health survey in

Medicare managed care. Health Care Financ Rev 2004;25:5-25.
13. Kosinski MK, Bayliss, M, Bjorner JB, Ware JE. Improving Estimates of SF-36® Health Survey Scores for Respondents in Missing Data. Medical Outcomes Trust Monitor 2000;5:8-10.
14. Ware JE Jr. Conceptualization and measurement of health-related quality of life: comments on an evolving field. Arch Phys Med Rehabil 2003;84(Suppl 2):S43-51.
15. Jurakić D. Taksonomske karakteristike zaposlenika srednje dobi kao osnova izrade sportsko-rekreacijskih programa [Doktorski rad]. Kineziološki fakultet, Sveučilište u Zagrebu, 2009;46.
16. U.S. Department of Health and Human Services. Healthy people 2010: Understanding and Improving Health. 2nd ed. Washington, DC: US Goverment Printing office. Accessible at the address: https://www.cdc.gov/nchs/data/hpdata2010/hp2010_final_review.pdf Date accessed: April 20, 2020
17. Pedišić Ž. Tjelesna aktivnost i njena povezanost sa zdravljem i kvalitetom života u studentskoj populaciji [Doktorski rad]. Kineziološki fakultet, Sveučilište u Zagrebu, 2011;52.
18. Pedišić Z, Rakovac M, Titze S, Jurakić D, Oja P. Domain-specific physical activity and health-related quality of life in university students. Eur J Sport Sci 2014;14:492-9.
19. Tasmektepligil M, Ağaoğlu S, Atan T, Cicek G. The contrastive study of physical activity levels of physical education students and the other department students. IJARS 2013;5:90-95.
20. Bosdriesz JR, Witvliet MI, Visscher TL, Kunst AE. The influence of the macro-environment on physical activity: a multilevel analysis of 38 countries worldwide. Int J Behav Nutr Phys Act 2012;9:110.
21. Jurakić D, Pedišić Ž, Andrijašević M. Physical activity of Croatian population: cross-sectional study using international physical activity questionnaire. Croat Med J 2009;50:165-73.
22. Calfas KJ, Sallis JF, Nichols JF, et al. Project GRAD: two-year outcomes of a randomized controlled physical activity intervention among young adults. Graduate Ready for Activity Daily. Am J Prev Med 2000;18:28-37.
23. Buckworth J. Exercise Adherence in College Students: Issues and Preliminary Results. Quest 2001;53:335-345.
24. Demarest S, Van Oyen H, Roskam AJ, et al. Educational inequalities in leisure-time physical activity in 15 European countries. Eur J Public Health 2014;24:199-204.
25. Mäkinen TE, Sippola R, Borodulin K, et al. Explaining educational differences in leisure-time physical activity in Europe: the contribution of work-related factors. Scand J Med Sci Sports 2012;22:439-47.
26. Mudronja L, Petračić T, Pedišić Ž. Physical activity and Barriers to exercise Among students from Faculty of Philosophy of Zagreb, In: Milanović D, Sporiš G, Eds., Proceedings Books of 6th International Scientific Conference on Kinesiology, Zagreb, 8-11. 2011. "Integrative power of Kinesiology", 2011;343-346.
27. Rakovac M, Pedišić Ž, Pranić S, Greblo Z, Hodak D. Sociodemographic and Lifestyle Correlates of Health-Related Quality of Life in Croatian University Students. Appl Res Qual Life 2013;8:493-509.
28. Maslić Seršić D, Vuletić G. Psychometric Evaluation and Establishing Norms of Croatian SF-36 Health Survey: Framework for Subjective Health Research. Croat Med J 2006;47:95-102.
29. Andrijašević M, Paušić J, Bavčević T, Ciliga D. Participation in leisure activities and self-perception of health in the students of the University of Split. Kinesiology 2005;37:21-31.
30. Marčinko I, Vuletić G and Davern M. Kvaliteta života studenata. In: Vuletić G, Ed. Kvaliteta života i zdravlje, Hrvatska zaklada za znanost, 2011:73-94.
31. Vuletić G. Samoprocjenjeno zdravlje i kvaliteta života u bjelovarsko-bilogorskoj županiji: regionalne razlike i specifičnosti. Radovi Zavoda za znanstveno istraživački i umjetnički rad u Bjelovaru 2013;7:213-222.
32. Paro HB, Morales NM, Silva CH, et al. Health-related quality of life of medical students. Med Educ 2010; 44:227-35.
33. Fallahzadeh H, Mirzaei H. Health Related Quality of life and Associated Factors among Iranian University Students. JCHR 2012;1:122-130.
34. Suleiman K, Alghabeesh S, Jassem H, Abu- Shahroor L, Ali R. Quality of Life (QOL) among University Students in Jordan: A Descriptive Study. JEP 2013;11: 161-167.