

# The Relationship Between Students' Physical Activity and Academic Stress

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## ABSTRACT

*Background.* Stress and physical inactivity are one of the most common risk factors among students. Problems of stress, experienced by students, and physical activity and impact on health are extremely important in order to improve students' quality of life and prevent health problems.

*Methods.* Academic stress was measured using the Konduri academic life stress questionnaire. Physical activity was evaluated by the Godin leisure time physical activity questionnaire. Distress was evaluated by the Reeder stress inventory. Study participants were 448 Lithuanian full-time first and third year bachelor's students, with ages ranging from 18 to 39 years; average age  $20.06 \pm 18.04$ . 38 percent (173) of people under investigation were women, and 62 percent (275) were men. 60 percent (268) of people under investigation were first-year students, 40 percent (180) were third-year students.

*Results.* Physically more active students experience less academic stress than less physically active students. Intense physical activity has the greatest impact on academic stress. Students who engage in intensive physical activity more often, experience less academic stress related to social support, motivation to achieve, training program and training mode, and self-confidence, compared with students who engage in intensive physical activity less often. It was found that women experience more academic stress, related to training program, academic aspirations, and career, compared with men. First-year students experience more academic stress, related to support, motivation to achieve, academic aspirations, self-confidence, and exam anxiety, compared with third-year students.

*Conclusions.* Half of all students go in for sports three or more times a week, a third of students go in for sports less than three times a week, almost one-fifth of students never go in for sports. Increased physical activity is among men, first-year students, compared with women and third-year students. A fifth of students experience stress, almost half of students experience nervous tension; one-third of students do not experience tension and stress. Higher stress, both general and related to academic activities, is felt by women and first-year students, compared with men and third-year students.

**Keywords:** students, physical activity, academic stress, stress.

## INTRODUCTION

The beginning of studies in high school is a significant life event - the stage of transition to adult life, which for the majority of people is full of anxiety and stress, because they need to adapt to the academic workloads and new educational, social and physical environment (Norkus & Aluzas, 2012; Misra & Castillo, 2004).

Therefore, students in institutions of high education, during the study year gain not only new experience, but experience and stress (Suresh et al., 2013; Dyson & Renk, 2006). Results of scientific research show that one of the best ways to cope with stress, to improve psychical well-being, is physical activity (Cairney, Kwan, Veldhuizen & Faulkner, 2014;

Boreham & Riddoch, 2001). It was found that the mental health of physically more active students is better (Griniene, 2006). However, studying, because of its prevailing mental work and stressful situations, gives little time for physical activity. The authors note that the intensive and time-consuming mental work reduces the need for active physical activity and increases mental and nervous tension (Eller, Aluoja, Vasar & Veldi, 2006).

Based on results of the scientific research, stress among students is widespread. According to Oswalt and Riddock (2007), 50 percent of students feel stress and 25 percent of students feel stress very strongly. Results of study performed by Karkockiene (2011), revealed that 50 percent of students from university and 38.5 percent of students from college often experience stress.

According to Eller et al. (2006), who analyzed students' well-being in many countries of the world, one of the health problems is symptoms of depression or depressive mood among students in Lithuania (Valinteliene et al., 2012; Poteriūniene, 2010; Vaščila et al., 2007), as well as in other countries (Stock et al., 2001; Kramer, Pruffer-Kramer, Stock & Tshiananga, 2004; Bostanci Bostanci, Ozdel, Oguzhanoglu, Ozdel, Ergin, Ergin & Karadag, 2005) where, due to the inability to combine sports exercises with studies, students' physical activity is insufficient.

Thus, physical inactivity and stress are among the most common risk factors among students. However, there is still a lack of studies which examine the relationship between the physical activity of students and stress (especially academic stress).

The aim of the study: To assess the relationship between students' academic stress and their physical activity.

The object of research: The relationship between students' academic stress and their physical activity.

## METHODS

Organization of the study: In order to assess the intelligibility of the questionnaire in November and December 2013, an exploratory study was carried out. To evaluate the validity of questionnaires, measuring the stress (L. G Reeder and N. Konduri), in January and February 2014 retesting estimates stability was conducted (test-retest). In October and November 2014 an anonymous questionnaire survey was carried out.

Participants in the study involved 448 Lithuanian full-time first and third year bachelor's students. Sample quantity was calculated, using the sample formula, dependent on the general set (Kardelis, 2007). After calculation, it was found that the study sample size (with the margin of error, which is 0,05) is 399. Thus, 448 respondents, who participated in study, are enough to represent the entire population, and the survey is representative. The age of people under investigation ranged from 18 to 39 years old, average age  $20,06 \pm 18,04$ . 38 percent (173) of people under investigation were women, and 62 percent (275) of people under investigation were men. 60 percent (268) of people under investigation were first-year students, 40 percent (180) were third-year students.

Research methods: Distress was evaluated by the Reeder stress inventory which consists of seven statements describing well-being, each of which is evaluated on a scale from 1 to 4. Scores of all seven statements are summed up, and the resulting overall score, which can range from 7 to 28, shows the typical respondent level of perceived stress: at 21- 28, there is no stress; at 15-20, there is nervous tension (intermediate state); 7-14 denotes a stressful condition. In this study reliability of the Reeder stress inventory is sufficient; Cronbach's alpha coefficient is 0.82.

Academic stress measured using the Konduri academic life stress questionnaire which consists of 27 statements. In response to each of the statements, the respondents were asked to mark one of four possible options: "it is not stressful or there is no stress" - scores 1; "little stressful" - scores 2; "at an average stressful" - scores 3; "very stressful" - scores 4. The higher the result, the higher the level of subjectively perceived stress. In this paper reliability of the Konduri academic life stress questionnaire is sufficient; Cronbach's alpha coefficient is 0.89. The Konduri questionnaire consists of seven factors: stress related to social support; stress related to achievements and motivation; stress related to training program and training regimen; stress related to academic aspirations; stress related to self-confidence; stress related to exams/implementation anxiety; and stress related to career.

Physical activity was evaluated by the Godin leisure time physical activity questionnaire. Respondents were asked to indicate how often they engage in certain physical activity each week. Near each line, i.e. "Vigorous physical activity", "moderate physical activity", and "low physical

activity”, the person under investigation had to write how many times within 7 days in their own time they engage in indicated physical activity for longer than 15 minutes. Physical activity result is calculated by the following formula: Total physical activity = (9 x “Vigorous physical activity”) + (5 x “moderate physical activity”) + (3 x “low physical activity”) (Kriska & Caspersen, 1997). Respondents can score between 0 and 119, the higher number corresponding with greater physical activity. Godin scale score interpretation: 24 units or more – vigorous physical activity (PA); 14-23 units – moderate PA; lower than 14 units - low PA.

Physical activity was also evaluated by asking: Over a 7-day period, how often in your spare time do you engage in regular physical activity, artificially long before you sweat (heart beats fast)? The answer options were: Often (three times a week and more); Sometimes (less than 3 times a week); or, Never.

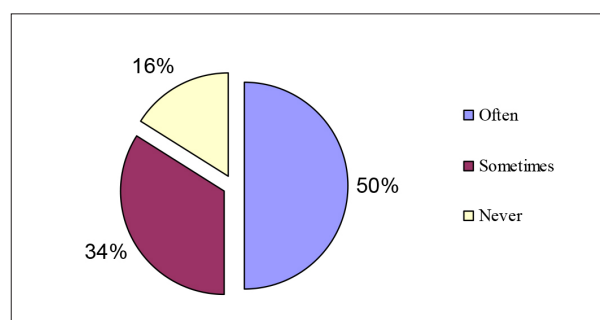
Statistical analysis: Statistical data analysis was performed, using SPSS 17.0 program of calculations. For comparison of frequencies the chi-square ( $\chi^2$  criterion) was used. Before using parametric statistical criteria distribution of scales, used in work, was specified according to the normal law. For evaluation coefficients of asymmetry and excess were used. The distribution was considered to be close to normal, when values of its coefficients of asymmetry and excess got into -1 - 1 interval. Mean comparison was performed, using Student's t-criterion. The relationship between variables was calculated on the basis of hierarchical regression analysis, in which the blocks of independent variables were placed. In the first block, sociodemographic and indicators related to studies, were placed; in the second block the indicator measuring general stress was placed; in the third block the indicator measuring physical activity was placed. Internal reliability of scales was calculated

on the basis of Cronbach's  $\alpha$  criterion. The results were considered statistically significant, if the error probability value  $p < 0.05$ .

## RESULTS

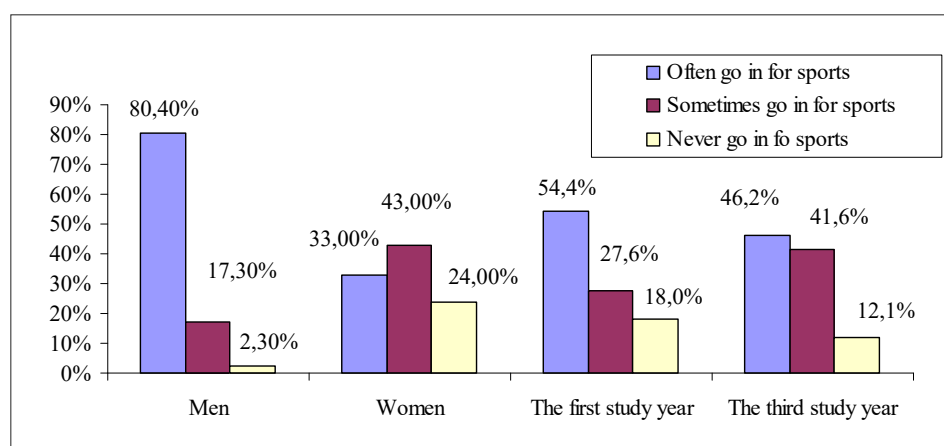
*Physical activity.* Analyzing physical activity of students, it was found that half of the respondents engage in regular physical activity often (three or more times a week), slightly more than one-third of respondents engage in physical activity sometimes (less than 3 times a week), while the remaining respondents never engage in physical activity (Fig. 1).

Fig. 1. Distribution of physical activity frequencies between men and women (in percent)



Comparing physical activity of students, gender and study year, statistically significant differences were found. Significantly more men reported going in for sports often, compared with women. Significantly more women reported never going in for sports, compared with men (Fig. 2). First-year students significantly more frequently stated going in for sports often, or never going in for sports, compared with third-year students. Among the third-year students significantly more respondents stated going in for sports sometimes, compared with first-year students (Fig. 2).

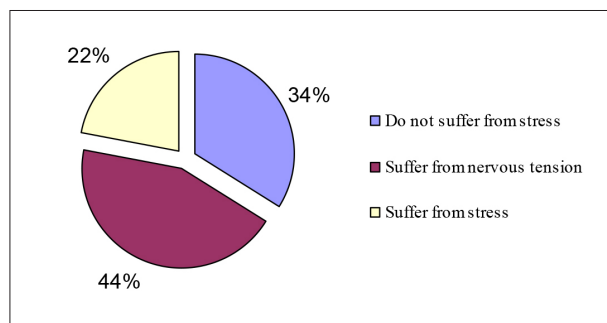
Fig. 2. Distribution of physical activity frequencies between men, women and study year (in percent)



$\chi^2 = 96.685$ ;  $lls = 4$ ;  $p = 0.001$

*General and academic stress.* Analysis results of stress show that slightly more than one-third of students do not suffer from stress and nervous tension; slightly more than a quarter of students suffer from nervous tension; and slightly more than two tenths of students suffer from stress (Fig. 3).

Fig. 3. Distribution of respondents according to the L.G. Reeder stress inventory (in percent)



The results indicated that women and first-year students experience greater tension (Table 1).

Table 1. Comparison of general stress between gender and study year

General stress	Name of variables	Mean $\pm$ standard deviation	t	p
	Man	19.25 $\pm$ 3.63		
Woman	17.76 $\pm$ 4.88			
	The first study year	17.82 $\pm$ 4.76	-3.036	<b>0.003</b>
	The third study year	19.15 $\pm$ 3.95		

Analyzing academic stress experienced by students, we compared the averages of scores. It was found that women experience more academic stress, related to training program, academic aspirations, and career, compared with men (Table 2). First-year students experience more academic stress related to support, motivation to achieve, academic aspirations, self-confidence, and exams anxiety, compared with third-year students (Table 2).

Table 2. Comparison of academic stress between gender and the first and third-year students

Academic stress	Gender and study year	Mean $\pm$ standard deviation	t	p
Social support – related stress	Man	7.75 $\pm$ 3.08	-1.699	0.090
	Woman	8.37 $\pm$ 4.09		
	The first	<b>8.76<math>\pm</math>4.03</b>	4.413	<b>0.001</b>
	The third	7.19 $\pm$ 3.06		
Achievements-motivation – related stress	Man	6.27 $\pm$ 2.28	0.08	0.936
	Woman	6.25 $\pm$ 2.59		
	The first	<b>6.53<math>\pm</math>2.56</b>	2.814	<b>0.005</b>
	The third	5.86 $\pm$ 2.29		
Training program – related stress	Man	8.79 $\pm$ 2.52	-2.619	<b>0.009</b>
	Woman	<b>9.58<math>\pm</math>3.34</b>		
	The first	9.21 $\pm$ 3.2	-3.94	0.694
	The third	9.34 $\pm$ 2.85		
Academic aspirations – related stress	Man	8.76 $\pm$ 2.69	-2.749	<b>0.006</b>
	Woman	<b>9.70<math>\pm</math>3.92</b>		
	The first	<b>9.94<math>\pm</math>3.84</b>	4.449	<b>0.001</b>
	The third	8.45 $\pm$ 2.74		
Self-confidence – related stress	Man	5.74 $\pm$ 2.09	-1.494	0.136
	Woman	6.09 $\pm$ 2.63		
	The first	<b>6.51<math>\pm</math>2.56</b>	6.035	<b>0.001</b>
	The third	5.14 $\pm$ 2.02		
Exams anxiety – related stress	Man	7.34 $\pm$ 7.88	-1.595	0.111
	Woman	7.88 $\pm$ 3.70		
	The first	<b>8.48<math>\pm</math>3.72</b>	6.347	<b>0.001</b>
	The third	6.44 $\pm$ 2.57		
Career – related stress	Man	5.7 $\pm$ 1.91	-3.346	<b>0.001</b>
	Woman	<b>6.49<math>\pm</math>2.72</b>		
	The first	6.21 $\pm$ 2.68	0.465	0.642
	The third	6.10 $\pm$ 2.08		
The overall of entire questionnaire	Man	50.03 $\pm$ 12.62	-2.624	<b>0.009</b>
	Woman	<b>54.58<math>\pm</math>19.74</b>		
	The first	<b>55.48<math>\pm</math>19.43</b>	3.958	<b>0.001</b>
	The third	48.70 $\pm$ 12.92		

### The relationship between stress, experienced by students, and physical activity

The relationship between stress, experienced by students, and physical activity was determined by dint of hierarchical regression analysis. The dependent variable is the academic stress. The main independent variable – physical activity. As relationship controlling factors, other independent variables were included: gender, study year, level of experienced stress (according to L. G Reeder scale).

Analyzing academic stress related to social support, it was found that variables of the first block explain 13.9 percent of dispersion of this particular stress. Statistically significant factors

explaining academic stress related to social support in the first block are gender and study year. Female gender and the first year of study explain the greater academic stress related to social support. Variables of the second block explain in addition 17.6 percent of dispersion of academic stress, related to social support. In the second block placed the total experienced stress was significant. The greater level of experienced stress explains the greater academic stress related to social support. The study year remained significant, while gender lost significance. Significantly related to academic stress factors is the third block are study year, level of experienced stress and intense physical activity.

Table 3. Predictive factors of social support related stress

Variable	Adjusted R	$\beta$	t	p
<b>The first block F(2)= 16.593, p= 0.001</b>	0.139			
Gender (woman)		0.107	2.326	<b>0.020</b>
Study year (the third)		-0.316	-6.648	<b>0.001</b>
<b>The second block F(3)=37.654, p= 0.001</b>	0.315			
Gender (woman)		0.033	0.782	0.434
Study year (the third)		-0.212	-4.844	<b>0.001</b>
General stress		-0.446	-10.250	<b>0.001</b>
<b>The third block F(6)= 24.240, p= 0.001</b>	0.323			
Gender (woman)		0.001	0.009	0.993
Study year (the third)		-0.214	-4.891	<b>0.001</b>
General stress		-0.444	-10.192	<b>0.001</b>
Vigorous PA		-0.093	-1.929	<b>0.044</b>
Moderate PA		0.061	1.258	0.209
Low PA		-0.055	-1.201	0.230

Table 4. Predictive factors of achievements and motivation related stress

Variable	Adjusted R	$\beta$	t	p
<b>The first F(2)=8.585 , p= 0.001</b>	0.069			
Gender (woman)		0.021	0.449	0.654
Study year (the third)		-0.212	-4.290	<b>0.001</b>
<b>The second block F(3)=16.423 , p= 0.001</b>	0.158			
Gender (woman)		-0.035	-0.756	0.450
Study year (the third)		-0.135	-2.792	<b>0.005</b>
General stress		-0.320	-6.644	<b>0.001</b>
<b>The third block F(6)=11.126, p= 0.001</b>	0.164			
Gender (woman)		-0.076	-1.512	0.131
Study year (the third)		-0.147	-3.030	<b>0.003</b>
General stress		-0.312	-6.483	<b>0.001</b>
Vigorous PA		-0.091	-1.955	<b>0.041</b>
Moderate PA		-0.046	-0.852	0.395
Low PA		-0.015	-0.301	0.764

Physical activity in addition explains 0.8 percent of dispersion of academic stress related to social support. Increased physical activity explains lower academic stress related to social support (Table 3).

Analyzing the stress related to achievements and motivation, it was found to be significantly related to the study year, stress and intense physical activity (Table 4). As can be seen in the third block, more intense physical activity explains in addition 0.6 percent of dispersion of academic stress, related to achievements and motivation (Table 4).

Analyzing academic stress, related to the training program and training regimen, it was

found to be significantly related to stress and intense physical activity (Table 5). More intense physical activity explains an additional 0.14 percent of dispersion of academic stress, related to the training program and training regimen (Table 5).

Analyzing the academic stress related to self-confidence, it was found to be significantly related to the study year, stress and intense physical activity (Table 6). As can be seen in the third block, more intense physical activity explains an additional 0.14 percent of dispersion of academic stress related to self-confidence (Table 6).

Table 5. The predictive factors of training program and regime related stress

Variable	Adjusted R	$\beta$	t	p
<b>The first block F(2)= 8.868, p= 0.001</b>	0.071			
Gender (woman)		0.107	2.230	<b>0.026</b>
Study year (the third)		-0.061	-1.234	0.218
<b>The second block F(3)=32.239 , p= 0.001</b>	0.276			
Gender (woman)		0.026	0.609	0.543
Study year (the third)		0.051	1.144	0.253
General stress		-0.481	-10.755	<b>0.001</b>
<b>The third block F(6)= 22.172, p= 0.001</b>	0.293			
Gender (woman)		-0.027	-0.586	0.558
Study year (the third)		0.042	0.939	0.348
General stress		-0.472	-10.661	<b>0.001</b>
Vigorous PA		-0.142	-2.880	<b>0.004</b>
Moderate PA		0.019	0.380	0.704
Low PA		-0.087	-1.850	0.065

Table 6. Predictive factors of self-confidence related stress

Variable	Adjusted R	$\beta$	t	p
<b>The first block F(2)= 13.830, p= 0.001</b>	0.11			
Gender (woman)		0.094	2.017	<b>0.044</b>
Study year (the third)		-0.326	-6.780	<b>0.001</b>
<b>The second block F(3)=35.803 , p= 0.001</b>	0.295			
Gender (woman)		0.018	0.423	0.672
Study year (the third)		-0.220	-5.007	<b>0.001</b>
General stress		-0.457	-10.447	<b>0.001</b>
<b>The third block F(6)= 24.146, p= 0.001</b>	0.309			
Gender (woman)		-0.039	-0.855	0.393
Study year (the third)		-0.230	-5.255	<b>0.001</b>
General stress		-0.451	-10.384	<b>0.001</b>
Vigorous PA		-0.149	-3.085	<b>0.002</b>
Moderate PA		0.025	0.524	0.601
Low PA		-0.050	-1.096	0.274

## DISCUSSION

This paper aimed to evaluate the relationship between academic stress and physical activity. The study found that physical activity is significantly related to academic stress. Physically more active students experience less academic stress, compared with less physically active students. In researching the impact of physical activity intensity on academic stress, it was found that intense physical activity has the greatest impact on academic stress. Students who more often engage in intense physical activities experience less academic stress, related to social support, achievements and motivation, training program and training regimen, and self-confidence, compared with students, who engage less often in intense physical activity.

Other researchers, who examined the relationship between physical activity and stress, also found that physical activity positively affects psychological human health. Nguyen-Michel, Unger, Hamilton, Spruijt-Metz, (2006) researched the relationship between physical activity of students and perceived stress and found that physically active students experience less stress. Lochbaum, Lutz, Sell, Ready and Carson (2004) found that physically more active students less often experience physical and mental health complaints. Grinienė (2006) revealed that the mental health, related to studies, of physically more active students, is better. Brown and Blanton (2002) researched the physical activity of students, participation in sports and suicidal behavior, and found that physically more active students experience less stress, and they are less prone to suicidal behavior. A number of studies revealed that physical activity is an effective tool for reducing stress and improving mental health (Cairney et al., 2014; Dunn, Trivedi & O'Neal, 2001; Fontaine, 2000).

Analyzing physical activity and stress from a gender perspective, it was found that female students experience greater stress and academic stress compared with male students. It was also found that male students are more physically active, and their physical activity is higher compared with female students. The obtained results confirm a number of other studies which indicate that male students are more physically active than female students (Bergier & Wojtyła, 2012; Grinienė, 2006). Also, female students experience more academic stress than male students (Balkishan et al., 2011; Gadzella, Pierce & Young, 2008; Goštautas, Grigaitė & Klasavičienė, 2004).

In this study, examining the relationship between academic stress, gender, and physical activity, it was found that female gender lowers physical activity and predicts higher academic stress.

Smith and Lynch (2012), who studied the relationship between physical activity and mental health, argue that physical exercise increases the amount of steroids, which have stress-reducing effects. During exercise, the body releases endorphins, neuropeptides that bind to opioid receptors in the brain and have analgesic effects. These hormones cause a full range of positive effects: improved mood, cognitive ability, pain reduction, regulated blood pressure, and improved breathing and digestion, all favorable for the immune system. Changes caused by physical activity improve cognitive functions and psychological status: they reduce anger, anxiety, but also promote structural adaptation in the brain (Booth, Moseley, Schiltenswolf & Hübscher, 2017). Better psycho-emotional well-being is also thought to be due to the fact that physical activity distracts people from depressing thoughts and stressors. Zschucke et al. (2015) state that strong physical activity alters the brain's response to strong stressors and affects cortisol secretion. It has been found that the amount of the stress hormone cortisol released in the stressful situation of athletes is lower than in people who are less physically active. Consequently, high physical activity can be beneficial in reducing stress (Basso & Suzuki, 2017).

Thus, the results of the study show that physical activity is related to lower stress experienced during studies. Therefore, in universities it should be relevant to involve students in active physical practice, to create conditions to enhance health, using physical education and engagement in sports, to eliminate the deficit in physical exercise, to improve physical training, and to help in the development of training and practice of sports skills. Foreign researchers already demonstrated that the beginning of high school studies is a favorable time to change lifestyle habits of students (Gayles & Hu, 2009), so Lithuanian high schools should use this opportunity.

Based on the results of this study more attention should be paid to first-year and female students. Physical activity should be encouraged and opportunities to be physically active at the university campus should be provided, as physically active students experience less academic and general stress.

## CONCLUSION

Half of all students go in for sports three or more times a week, a third of students go in for sports less than three times a week, almost one-fifth of students never go in for sports. Greater physical activity is among men and first-year students, compared with women and third-year students. A fifth of students experience stress and almost half of students suffer from nervous tension; one-third of students do not suffer from tension

and stress. Higher general stress, and stress related to academic activities, is felt by women and first-year students, compared with men and third-year students. Students who engage in intense physical activity more often, experience less academic stress – related to social support, achievements and motivation, training program and regime, and self-confidence – compared with students who engage in intense physical activity less often.

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