Relation between learning strategies and techniques, anxiety, and psychosomatic symptoms in 8th and 9th grade elementary school students

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Abstract

The study presented in this paper aims to examine the frequency of psychosomatic symptoms in students and their interaction with learning strategies and techniques. In addition, it aims to examine anxiety as a personality trait and its mediation effect between learning strategies and psychosomatic symptoms, with self-regulated learning linking cognitive, motivational, and emotional aspects of learning, serving as a theoretical framework. The sample comprises 420 students, aged 13.7 years on average, with a balanced percentage regarding gender. Through a descriptive analysis, it has been established that the commonest psychosomatic symptoms are gastrointestinal, pseudo-neurological, and symptoms of pain/feeling of weakness. The results show that learning strategies are negatively related to both the frequency ($r=-.22, p<.01$) and the intensity of the interference with psychosomatic symptoms ($r=-.17, p<.01$), as well as to anxiety ($r=-.21, p<.01$). Anxiety as a personality trait has a significant mediation effect between learning strategies and the frequency of psychosomatic symptoms ($R^2=.208, b=-.437, SE=.219, 95\% \text{ CI } [-.75, -.21]$) and learning strategies and the intensity of interference with psychosomatic symptoms ($R^2=.111, b=-.363, SE=.126, 95\% \text{ CI } [-.66, -.15]$). The mediation effect of anxiety in relation to learning techniques – frequency/intensity of interference with psychosomatic symptoms has not been established. The results point to the need for providing training to students with regard to a self-regulated learning process and the application of efficient learning strategies from early grades, in order to reduce the risk of psychosomatic symptoms occurrence.

Keywords: *learning strategies, learning techniques, self-regulated learning, anxiety, psychosomatic symptoms.*

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Introduction

One of the important tasks of the education system in every society is to enable students to learn independently and to continuously develop motivation for achievement. Research shows that many students achieve low learning results despite having average cognitive abilities, which implies that school achievement depends not only on cognitive but also on psychosocial factors. According to the results of a meta-analysis (Robbins et al., 2004), the best predictors of school achievement proved to be academic self-efficacy and motivation. Motivational processes have an impact on acquisition, transfer, and the use of a student's knowledge and skills. In that respect, research within the social-cognitive framework illustrates the significance of adaptive and motivational patterns (Dweck, 1986), which are reflected on educational efficiency. Poorly motivated students rarely use efficient learning strategies, which is reflected, long term, on their emotional functioning and behaviour. In most cases, students are not aware what the problem is, so they usually believe their abilities are insufficiently developed and they do not really try to change anything about their work habits and learning strategies, which leads to the development of the dysfunctional style of attribution. These dysfunctional attributions of students' failures are often accompanied by feelings of guilt, shame, or anger (Weiner, 1985). More recent evidence suggests that, in addition to cognitive abilities, achieving success in learning also requires efficient learning strategies, which include various types of thinking and behaviour that facilitate the acquisition of new information, integration with existing knowledge and successful recollection (Musso, Kyndt, Cascallar, & Dochy, 2012). Learning techniques include an understanding of what was read, the highlighting of text, the use of textbooks and the writing of notes, explaining unknown terms, etc. (Jovanović-Ilić, 1977). In this field, what is traditionally present are cognitive models which prove to be useful for exploring the general competence of students, but they neglect the social and cultural conditionality of learning, emotional and motivational processes as well as differences in learning resulting from the specificity of the content to be learned (Pastuović, 1997). One should start introducing efficient learning strategies and techniques as early as possible, since the final plateau in developing learning strategies and techniques is reached relatively early (Jovanović-Ilić, 1977).

Research on the relation between school achievement and mental health point to a mutual interaction: on the one hand, learning difficulties may become a trigger for various symptoms, and on the other, the symptoms may disturb the learning processes. Inefficient learning strategies, weak motivation and inadequate work habits represent the causes of underachievement at school and of students' dissatisfaction, and some of them may even become long-term stress sources. Such and similar situations may cause students to experience physical or psychosomatic symptoms. Psychosomatic symptoms represent all bodily symptoms that appear under the influence of emotional factors, and they generally include one organ system under the control of the autonomous nervous system (Vulić-Prtorić, 2005). These are classified in accordance with the organ system predominantly included in the symptomatology: gastrointestinal, respiratory, pseudoneurological, cardiovascular, dermatological, etc. Children and young people between 4 and 18 years of age in most cases refer to headaches, stomach aches, nausea, vomiting, ver-

tigo, etc. The occurrence of certain symptoms is determined by the context: vertigo and disorientation appear more often in public situations (while talking to authority figures/teachers), whereas chest pain and breathing issues tend to happen in a private environment, mostly at home (Vulić-Prtorić, 2005). In most cases, students in early and mid-adolescence have a more simple clinical profile of psychosomatic symptoms than adults. Certain psychosomatic symptoms may appear in a milder form as a component of normal development, especially during puberty, when more attention is dedicated to physical changes. Symptoms may appear as one or multiple lower intensity symptoms or a higher number of very intensive symptoms that disturb students' everyday lives. The first symptoms mainly appear in childhood and adolescence. One symptom is usually followed by another. Some symptoms stabilise in the long term, such as abdominal pain in childhood, so 25–50% of cases continue to have identical symptoms during adulthood (Walker, Van Slyke, & Greene, 1995).

Students' failure in learning is connected to a certain anxiety level which may be useful in certain situations, but if it crosses the limit, it acts as an obstructing factor (Rijavec, Miljković i Brdar, 2008; Vizek Vidović, Rijavec, Vlahović-Štetić i Miljković, 2003). Anxiety presents as "the feeling of fear, worry, uneasiness and tension, the feeling of being threatened before a future expected and unpleasant situation. It differs from fear in its complexity, but also diffuseness and uncertainty, since it is not connected to a concrete object" (Trebješanin, 2004, pp. 32). It often appears in childhood, and research shows that 6–8% of children and adolescents suffer from a certain form of anxiety disorder (Bogels & Zigterman, 2000).

In accordance with Spielberger's (1972) theoretical postulates, anxiety is considered as both a personality trait and a condition. In our research, we observed anxiety as general anxiety or a personality trait, that is, how a student feels in general. General anxiety includes a tendency acquired in early childhood, at pre-school and primary school age, via one's relationship with one's parents.

Objectively harmless situations are perceived as threatening and one reacts to them more intensely than the objective situation would normally require. In personality theories, anxiety is most commonly observed as a personality trait within neuroticism or negative sensitivity and is the most described personality trait (Costa & McCrae, 1992; Eysenck, 1991; Zuckerman, 1992). In cases where success at school is not in accordance with parents' expectations, anxiety is intensified. Zarevski (1997) says that parents threaten children in regard to school too often, which contributes to intensifying their already present anxiety as a personality trait. Highly anxious students in exam situations use inefficient learning strategies (Benjamin, McKeachie, Lin, & Holinger, 1981). Furthermore, the anxiety reported by the same anxious students may be intensified by inadequate knowledge acquisition.

The students from our sample (from 12 to 14 years old) are in a sensitive development period called early adolescence or pre-adolescence (Daneš, 2004; Letić, 2012), when the dominant challenge is adapting to biological changes, as well as the pressure of studying and achieving the best possible scores in order to enroll in the high school of their choice. This is a period of great upheaval, characterized by "emotional and moral crises, turmoil and rambling" (Trebješanin, 2004, pp. 13).

The prevalence of somatisation in childhood and adolescence in the general population ranges from 2% to 10%, according to some authors (Carr, 1999). Garber, Walker and Zeman (Garber, Walker, & Zeman, 1991) say that more than 50% of school children suffer from at least one symptom of somatisation, and more than 15% suffer from four or more symptoms. According to the information on the prevalence of somatisation symptoms, in most cases the symptoms are specific, the most common being headaches (10% to 30%, or, according to some research, up to 70%); recurrent abdominal pain (10% to 20%); pain in limbs and muscles (5–20%); chest pain (7–15%); fatigue (30–50%) (Egger, Costello, Erkanli, & Angold, 1999; Garber et al., 1991; Santalahti, Aromaa, Sourander, Helenius, & Piha, 2005). In research conducted among primary school students (Bulatović, 2013), a statistically significant difference was determined between male and female students, whereby male students expressed a higher degree of general anxiety. Other research exploring anxiety at the symptom level shows that female students list more anxiety symptoms (Del Barrio, 1997; Vulić-Prtorić, 2002). This paper explores the relation between learning strategies and learning techniques, anxiety, and psychosomatic symptoms in 8th and 9th grade elementary school students.

Aim

The aim of this research was to explore the frequency of psychosomatic symptoms among female students and their relationship with learning strategies and techniques. Additionally, we explored anxiety as a personality trait, including its mediatory relation between learning and psychosomatic symptoms. Our hypothesis was that inadequate strategies and learning techniques are a potential stress source and risk factor for psychosomatic expressions in final grade primary school students. We observed anxiety as a mediator, and learning strategies and techniques as predictors, since we supposed that inadequate strategies and learning techniques intensify the already present anxiety and are more likely to lead to somatisation compared to students who do not show high anxiety as a predisposition factor.

Method

Sample

The sample includes 420 students from the two final grades of primary school in Banja Luka (Bosnia and Herzegovina), aged between 12 and 14 ($M=13.6$; $SD=.61$). The sample is almost balanced in terms of gender (51.2% male students to 46.9% female students), with 1.9% examinees providing no answer to the question. Furthermore, the percentages of 8th and 9th graders are quite close (51.3% in favour of the 9th grade). Students' average grade is 4.35 (5 being the highest grade). 37.3% of students had sought medical care, and 17.1% said they suffered from a chronic health condition (such as allergies, asthma, bronchitis, gastritis, diabetes, thyroid gland). We excluded students with chronic health conditions from the sample, our hypothesis being they may have similar or identical symptoms as part of their primary disease. The result of the *t*-test for independent samples shows a significant difference between students who suffer from chronic health conditions and

those who do not, regarding the frequency of psychosomatic symptoms ($t(441)=2.71$, $p<.01$). The difference between these two groups is small (Hedges' $g=.33$), but it is evident that students with a chronic illness suffer from psychosomatic symptoms more frequently. Furthermore, there are significant differences between these two groups regarding the disturbance effects of psychosomatic symptoms on functioning, $t(361)=2.67$, $p<.01$. The difference is small in this case as well (Hedges' $g=.35$), and the students with diagnosed chronic health conditions are more distracted by psychosomatic symptoms in everyday functioning compared to the students who do not suffer from chronic diseases².

In this research we were interested in psychosomatic symptoms in students who do not suffer from chronic health conditions, therefore, all further analyses refer to respondents without a chronic illness.

Instruments

The following measuring instruments were used:

The questionnaire for psychosomatic symptoms for children and adolescents (PSS, Vulić-Prtorić, 2005) is a self-evaluation instrument consisting of a list of 35 psychosomatic symptoms and sensations. The listed symptoms are the most common ones in the research field of psychosomatic and somatomorphic disorders in childhood and adolescence, and in DSM-IV qualification. According to the functioning field they belong to, the list consists of the following symptoms: pseudoneurological (vertigo, the feeling of losing balance, the feeling of a 'lump' in the throat), gastrointestinal (nausea, stomach ache), and a pain/feeling of faintness (lack of energy, back pain, joint pain), cardiovascular (accelerated heartbeat, chest pain), respiratory (breathing problems, choking sensation), dermatological (skin rash, itchiness or skin redness), muscularity (muscle tension, weakness in muscles).

Each symptom was evaluated on two Likert-type self-evaluation scales: on the first scale, students assessed the frequency of symptoms on the four-point scale; on the second, students assessed the distraction level of psychosomatic symptoms during everyday activities on a three-point scale (Vulić-Prtorić, 2005).

The questionnaire also includes additional questions related to the general health status of the respondent. The first question requires self-evaluation of their own health status (*What do you think, how is your health, in general?*), to which a respondent answers using the Likert-type 4-point scale (1=bad, 2=mediocre, 3=very good, 4=excellent); the second question refers to the seriousness of the aforementioned symptoms (*Have you ever had to visit a doctor due to the aforementioned health issues?*), and the respondent answers with a YES or NO; the answer to the third question provides insight into the general health condition of the respondent, as well as the diseases they may be suffering from (*Do you suffer from an illness, such as asthma, allergies, diabetes, etc?*).

The PSS is a questionnaire of satisfactory psychometric qualities, whose reliability, expressed by Cronbach's alpha coefficient, obtained through the test author's research,

2 In order to present the extent of the effect, the authors use Hedges' g coefficient, since there are two disproportionate groups in terms of size, where this coefficient appears to be a more adequate solution (Cumming, 2012).

is $\alpha=.89$ for the Frequency scale, whereas for the Distraction scale it is $\alpha=.93$ (Vulić-Prtorić, 2005). In our research, the PSS showed high reliability: for the Frequency scale, it was $\alpha=.91$, whereas for the Distraction scale it was $\alpha=.96$ (Table A1).

Inventory of habits and learning techniques (INTU, Jovanović-Ilić, 1977) consists of four sub-scales measuring non-cognitive factors affecting a student's academic achievement. We applied a subscale referring to strategies and learning techniques, which consists of 16 questions operationalised into two groups. One group refers to learning strategies (question example: *Do you look for an explanation of unknown words you encounter in a text?*), and the other refers to learning techniques (question example: *Do you study late at night before an exam?*). Respondents provided answers through the 3-point scale, and the results were expressed as a summation score for each subscale separately. In our research, the reliability of the scales applied was low: for the learning strategies subscale it was $\alpha=.41$, whereas for the learning techniques subscale it was $\alpha=.48$ (Table A1).

Spielberger's questionnaire for self-evaluation of anxiety as a personality trait (STAI, Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) measures general anxiety as a personality trait, that is, relatively stable individual differences in anxiety-proneness. STAI consists of 20 items (assertion sample: *I do not have enough confidence.*) The respondents provided their answers on the 4-point scale describing the frequency of the anxiety phenomenon (almost never, sometimes, often and almost always). The scale shows high internal consistency, $\alpha=.90$ (Spielberger, 1972), and for our research, $\alpha=.89$ (Table A1).

General information questionnaire was constructed for the purpose of this research. We used it to obtain basic socio-demographic information on the respondents, such as gender, age, average grade at the end of the previous grade, conduct grade, the number of excused and unexcused absences from class, and whether they had support from a family member or a professional while doing homework. The questionnaire also elicits information about the education level of a respondent's parents.

Procedure

The questionnaires were prepared by the authors of the research with the help of colleagues in primary schools. In accordance with ethical norms and standards regarding surveys among students, the authors obtained consent from the principals of the schools and the students' parents. Before the administration of the questionnaire, the students were informed about the manner of filling in the questionnaire. The task of the respondents was to, after reading a claim/question, circle the appropriate number on the right-hand side below the answer they had selected. The survey was carried out during one school class in December 2017 in four primary schools in Banja Luka (Bosnia and Herzegovina, the Republic of Srpska). The schools were chosen by the method of random selection, by means of a random number generator. Sixteen out of 26 elementary schools on the territory of the City of Banja Luka were included in the survey (one class from each school). The sample encompassed 9.96% of 8th- and 9th-grade elementary school students. According to the Republic Pedagogical Institute data, the number of students regarding the aforementioned grades in the City of Banja Luka for the school year of 2017/2018 was 4,216.

Analysis

The statistical analysis was performed with the aid of SPSS v.22 (IBM corp., 2013) software. The analysis includes a descriptive analysis, correlations, t-test, ANOVA for the repeated measurements and mediation analysis. The mediation analysis was applied with the aim of checking if anxiety as a personality trait has a mediating effect on the relationship between learning strategies (predictor variable) and psychosomatic symptoms (criterion variable). This analysis was performed within the PROCESS 3.0 (Hayes, 2018) package.

Results

Based on descriptive statistics (Table A2), we can observe the frequency of occurrence of psychosomatic symptoms in the following subscales: 1) gastrointestinal, 2) pseudoneurological, 3) pain/feeling of faintness, 4) cardiovascular, 5) respiratory 6) dermatological, and 7) muscular. We also conducted a post hoc analysis with a Bonferroni correction (Field, 2009). Results of the post hoc analysis indicate that pseudoneurological symptoms and symptoms of pain/feeling of faintness occur significantly more often ($p < .001$) than all the other scales. These results are congruent with results of similar research that showed pseudoneurological and gastrointestinal symptoms are the most common in this population (Bernstein et al., 1997; Garber et al., 1991; Vulić-Prtorić, 2005; Walker et al., 1995).

The highest rate of disturbance of daily activities due to psychosomatic symptoms is shared by gastrointestinal and pseudoneurological symptoms, while symptoms of pain/feeling of faintness have a slightly lower rate (Table A3). Variance analysis was carried out for repeated measurements across the sample to identify potential differences among various groups of psychosomatic symptoms by frequency and by disturbance. Results indicate the existence of statistically significant differences of large-scale effect (Cohen, 1988, qtd. In Cumming, 2012) among groups of psychosomatic symptoms within the frequency scale ($\lambda = .06$, $F(6.355) = 838.38$, $p < .001$, $\eta^2 = .93$).

Table 1 features means and standard deviations with regard to gender for anxiety, psychosomatic symptoms, reduced functionality due to psychosomatic symptoms, learning strategies, and learning techniques scores.

Table 1
The results of descriptive statistics with regards to gender

	Boys			Girls			<i>t</i>	<i>df</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>			
Learning strategies	7.47	2.98	198	6.36	2.35	192	4.18**	410	.41
Learning technique	8.95	3.15	215	7.46	3.02	197	4.90**	410	.48
Anxiety	40.4	10.26	180	42.84	11.27	178	-2.15*	256	.22
Frequency of PSS	50.33	13.87	183	55.90	12.98	171	-3.89*	352	.41
Disturbance by PSS	46.88	13.90	153	52.95	15.13	136	-3.50*	287	.40

Note: *= $p < .05$ **= $p < .001$; PSS – psychosomatic symptoms

Statistically significant differences in average scores were identified between male and female students for all variables examined, with male students achieving higher scores on subscales regarding learning strategies and learning techniques. On the other hand, the female students scored higher in terms of anxiety. Furthermore, a significantly higher frequency of psychosomatic symptoms and a perception of their disturbance of everyday activities was detected in the female students.

Table 2

Correlations between variables examined (N=420)

	Learning technique	Anxiety	Frequency	Interruption by PSS
Learning strategy	.28**	-.21**	-.22**	-.17**
Learning technique		-.09	-.07	-.01
Anxiety			.43**	.32**
Frequency of PSS				.58**

Note: **= $p < .01$

Based on the variables examined (Table 2), a positive correlation between learning strategies and learning techniques is established, whereas learning strategies are negatively correlated with anxiety as a personality trait, the presence of psychosomatic symptoms, and the disturbance of everyday activities due to psychosomatic symptoms. With regard to this table, the most important finding is that learning strategies are correlated with anxiety and psychosomatic symptoms, whereas learning techniques are not correlated to a significant extent either with anxiety or with the frequency or interference of psychosomatic symptoms.

In addition, anxiety positively correlates with the frequency of psychosomatic symptoms and with the interference of psychosomatic symptoms, with the frequency of occurrence and the extent of interference of psychosomatic symptoms being in mutually statistically significant correlation.

Table 3

Mediation analysis: Direct and indirect effects of learning strategies on the frequency of psychosomatic symptoms through anxiety as a personality trait

Directness of the effect	Effect (<i>b</i>)	SE	95% CI of the effect	P
Direct effect (<i>c'</i>)	-.807	.252	[-1.30, -.31]	<.01
Indirect effect (<i>a*b</i>)	-.437	.129	[-.75, -.21]	/

Notes: *b* = non-standardised coefficients; SE= standard measurement error; 95% CI= 95% reliability interval; *p*= statistical significance (not available for indirect effect). The statistical significance of indirect effect was assessed based on the upper and lower limits of reliability interval, with those intervals not containing 0 within their limits taken as statistically significant.

The results reveal that learning strategies are a significant predictor of anxiety as a personality trait, with $b = -.993$, $SE = .249$, and $p < .001$, and that the latter is a significant predictor itself of the frequency of psychosomatic symptoms occurrence, with $b = .356$, $SE = .075$, and $p < .001$. In addition, the results of mediation analysis show that learning strategies as a predictor have a lower non-standardised regression coefficient after the

introduction of a mediator in the analysis, with $b=-.80$ and $SE=.252$. The predictors in this analysis account for around 20% of the variance ($R^2=.208$). The indirect effect was examined through bootstrap on 1,000 samples, with results showing a significant indirect coefficient of $b=-.437$ and $SE=.129$ (Table 3).

Table 4

Mediation analysis: Direct and indirect effects of learning strategies on disturbance caused by psychosomatic symptoms through anxiety as a personality trait

Directness of the effect	Effect (b)	SE	95% CI of the effect	P
Direct effect (c')	-.597	.311	[-1.20, .02]	.06
Indirect effect (a*b)	-.363	.126	[-.66, -.15]	/

Notes: b= non-standardised coefficients; SE= standard measurement error; 95% CI= 95% reliability interval; p= statistical significance (not available for indirect effect). The statistical significance of indirect effect was assessed based on the upper and lower limits of reliability interval, with those intervals not containing 0 within their limits taken as statistically significant.

The results reveal that learning strategies are a significant predictor of anxiety as a personality trait, with $b=-.968$, $SE=.231$, and $p<.001$, and that the latter is a significant predictor itself of the intensity of psychosomatic symptoms occurrence, with $b=.451$, $SE=.059$, and $p<.001$. These results confirm the mediation hypothesis. The results shown in Table 4 reveal that learning strategies as a predictor have a lower non-standardised regression coefficient after the introduction of a mediator in the analysis, with $b=-.597$ and $SE=.311$. The predictors in this analysis account for around 11% of the variance ($R^2=.111$). The indirect effect was examined through bootstrap on 1,000 samples, with results showing a significant indirect coefficient of $b=-.363$ and $SE=.126$ (Table 4).

Given the fact that learning techniques are not correlated either with anxiety or the intensity of psychosomatic symptoms, no mediation analysis was conducted.

Discussion

The research results were obtained on a sample of 420 senior year students in four elementary schools in the area of the city of Banja Luka, whose average age is 13.7 years. The sample included only students claiming they do not suffer from any chronic conditions (e.g. asthma, bronchitis, gastritis, diabetes, thyroid gland diseases).

The findings of this research indicate a difference in study skills between male and female students: male students report that they implement learning strategies and techniques more efficiently than female students. Results of similar research indicate that the performance of male and female students in Serbia and Vojvodina tilts significantly in favour of the female groups. In Kosovo, on the other hand, it is also female groups that perform better, but only marginally, which is most likely a result of social and historical circumstances (Jovanović-Ilić, 1977).

Psychosomatic symptoms in students are significantly linked, in the negative direction, to learning strategies, while this is not the case for learning techniques. We assume

that learning strategies are more complex mental processes, that fewer students have mastered them, and that avoiding implementing them takes a bigger toll on the psychological and physical well-being of the students. Learning techniques are less complex mental processes; they facilitate the learning process itself in the sense that the learning activity is carried out in the most economical manner. They are linked to the individual approach to school work, and particularly to motivation for high achievement in school, which is reflected on the psychological and physical functioning of the student. The learning workload is linked to the curriculum, the students' perception of its difficulty, and a large number of course units and classes per unit. Similarly, senior year students in elementary schools in most countries of the former Yugoslavia have 15 course units in the curriculum, i.e. 6 class units per day. Efficient institutional learning requires proper learning strategies and techniques, among many other factors that impact one's performance at school. Research results from foreign and national authors (Ausubel, Novak, & Hanesian, 1978; Jovanović-Ilić, 1977, Kvaščev, 1978; Stojaković, 2002) indicate that efficient organisation and structure of knowledge is one of the main prerequisites for successful learning and the acquisition of knowledge.

Extensive content and methods of work in schools and teachers' and parents' expectations may bring about stressful reactions in students, having in mind that not all students will experience the same level of stress, and consequently not all students will develop psychosomatic symptoms. It is most likely that those students who are the most sensitive and insecure, i.e. most anxious and ambitious, carry the greatest risk of psychosomatic disorders.

The most common psychosomatic symptoms in our research were gastrointestinal, followed by pseudoneurological and a feeling of pain or faintness. The same respective order applies to the disturbance of daily activities caused by psychosomatic symptoms. A statistically significant medium intensity difference was identified in relation to gender, where female students display higher levels of both the frequency of the appearance of psychosomatic symptoms and the disturbance of daily activities caused by these symptoms. Other researchers have obtained similar results (Bulatović, 2013; Kozjak Mikić i Perinović, 2008; Vulić-Prtorić, 2016). There is a slight difference with regard to anxiety, where female students have higher scores, which is corroborated by similar research (Del Barrio, 1997; Vulić-Prtorić, 2002).

It is also very characteristic of schools that students mostly complain about headaches, stomach ache and a general feeling of pain, i.e. faintness. Pseudoneurological symptoms usually manifest as headache symptoms with no organic cause. As reported by parents and teachers, students complain about headaches more often in periods of time when their study workload is increased or during examination season.

Gastrointestinal symptoms manifest as stomach ache, nausea, vomiting and other digestive disorders, none of which have an organic cause. These symptoms, whether pseudoneurological, abdominal or gastrointestinal, usually dissipate as the workload is decreased or ceases. The third most common group of symptoms in our research is general pain/feeling of faintness, not related to any particular organ. The analysis included results of the muscular psychosomatic symptom subscale, considering the fact that the

respondents' results were lowest there. Muscular symptoms, i.e. muscle pain, occur rarely at the school age, and much more often in the adult population.

Statistical analysis for the disturbance subscale indicates that the results are in line with the frequency of the psychosomatic symptoms, since the psychosomatic symptom frequency subscale and the disturbance subscale are linked ($r(418) = .28, p < .01$), which means that students who experience more frequent psychosomatic symptoms, at the same time experience these symptoms as more disturbing for their daily activities. Each student perceives the breadth and difficulty of the curriculum individually, depending on many factors, one of which is personality traits. The analysis highlighted the direct and indirect effects of learning strategies on the manifestation frequency of psychosomatic symptoms and the disturbance of daily activities caused by these symptoms through anxiety as a personality trait. Mediation analysis was done for the learning strategy subscale, because it displayed a statistically significant correlation with the applied tests (Anxiety Questionnaire, Psychosomatic Symptoms Questionnaire), while the learning techniques subscale did not display any statistically significant correlations (Table 3). The predictors in this analysis explain around 20% of the variance. Learning strategies, as one of the aspects of self-regulated learning, are linked to psychosomatic symptoms by .44 points (in the negative direction) through anxiety as a personality trait.

Although not all preconditions were met for a classic approach to mediation analysis, the mediation effect is obvious based on the peak and trough of the confidence interval, which is more precise as a measurement than the Sobel test (Hayes, 2009). Essentially, if learning strategies are maintained as a constant, and anxiety as a personality trait is incrementally increased by one score at each step, then the link between learning strategies and the manifestation of psychosomatic symptoms drops by around .44. For example, if students use multiple efficient learning strategies, they manifest fewer psychosomatic symptoms, for as long as their anxiety level is not high. If anxiety increases, the effect of the learning strategies on the manifestation of the psychosomatic symptoms decreases. Practically, that means that a student with a score of 15 (moderate) on the anxiety test will be significantly different than a student with a score of 30 (high) when it comes to the effect of learning strategies on the manifestation of psychosomatic symptoms. Higher scores of anxiety become dominant over learning strategies, which become less efficient. All of this indicates that mild anxiety does not have negative effects, while high anxiety represents a disruptive factor for learning and daily activities, as confirmed by similar research (Rijavec et al., 2008; Vizek Vidović et al., 2003).

Table 4 indicates that learning strategies as a predictor have a lower non-standardised regression coefficient after the introduction of the mediator in the analysis. This means that learning strategies are linked to a disturbance from psychosomatic symptoms by .36 points (in the negative direction) through anxiety. The mediatory role of anxiety as a personality trait has been confirmed. Extremely anxious students are mostly hyper-sensitive with regard to failure and criticism, so they are usually more motivated to succeed at school, which puts an additional burden on them and reduces the efficiency of learning strategies. In terms of efficient learning strategies, most students are either not adequately equipped to use them or not to a satisfactory extent, with that process still evolving (Mi-

hajlović, 2013). More than half of the students from our sample (56.2%) require assistance from their parents when learning.

Research indicates the integration of personal characteristics, psychological processes and contextual variables that represent the basis of school learning, which particularly refers to the research of self-regulated learning, resulting from different models connecting cognitive, motivation and emotional aspects of learning (Beischuizen & Steffens, 2011; Sorić, 2014; Young, 2005; Zimmerman & Schunk, 1989). Theorists studying this type of learning stress the active role of a student who seeks, creates and processes information, and who is not just a passive recipient of information from his/her environment (Vizek-Vidović et al., 2003).

The advantage of this research is in opening up some issues that have thus far rarely been explored in our educational practice. It encompasses a broader context of observing students' problems from a psychological and pedagogical point of view, which should eventually lead to more suitable breadth and content of curricula. This paper has also accentuated the students' mental health. The shortcomings of this research are the subscales on learning strategies and techniques, which have shown unexpectedly low reliability. This is why any future research must apply a more appropriate instrument for measuring learning strategies and techniques.

Implications for pedagogical practices

The pedagogical implications of this paper reflect the need for continuous education of students on learning techniques, strategies for coping with stress, and motivation for learning that contributes to developing efficient learning strategies. In order for students to adopt efficient learning strategies, different methods are used (Torrano Montalvo & Gonzales Torres, 2004), such as:

- direct training, through which characteristics of efficient strategies are explained to students;
- modeling, which is the acquisition of steps taken in planning, using, and distributing cognitive sources;
- practicing the implementation of learning strategies and gradual taking of personal responsibility and control over one's learning; and
- monitoring the efficiency of the learning strategies applied.

Educational programmes should encompass contents relating to securing social support by teachers and peers. In addition, appropriate and timely measures taken by psychological and pedagogical services in schools, directed towards teachers, students, and parents, should contribute to preventing mental health issues and mental disorders in students. In terms of moral education, contents adjusted to the age of students should contribute to reducing tension and pressure, encouraging motivation for learning, and creating a more efficient school culture and learning space.

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Appendix

Table A1

Descriptive statistics and internal reliability of used scales

Scale	N	Min	Max	M	SD	Sk	Ku	α
Learning strategies	8	.00	16.00	6.93	2.74	.25	.24	.41
Learning techniques	8	.00	16.00	8.20	3.18	.10	-.31	.48
Anxiety	20	21.00	78.00	41.74	10.98	.56	.18	.89
Frequency of PSS	35	35.00	128.00	53.00	13.67	1.58	4.32	.91
Disturbance by PSS	35	35.00	105.00	49.72	14.72	1.35	1.85	.96

Legend: N= number of items; Min= minimal value manifested on the scale; Max= maximal value manifested on the scale; M= arithmetic mean; SD= standard deviation; Sk= skewness; Ku= kurtosis; α = Cronbach's alpha coefficient of internal reliability; PSS = psychosomatic symptoms

Table A2

Descriptive statistics of the subscales of the frequency scale

Subscale	N	Min	Max	M	SD	Sk	Ku
Pseudoneurological (N=398)	9	9.00	36.00	11.95	3.63	2.01	6.31
Cardiovascular (N=409)	3	3.00	12.00	4.69	1.86	1.27	1.46
Muscular (N=409)	2	2.00	8.00	3.01	1.40	1.45	1.47
Respiratory (N=403)	3	3.00	12.00	4.67	1.64	1.54	2.60
Gastrointestinal (N=399)	9	9.00	34.00	13.34	4.09	1.40	2.59
Dermatological (N=406)	3	3.00	15.00	4.67	1.82	1.57	3.90
Pain (N=402)	6	6.00	22.00	10.95	3.41	.85	.51

Legend: N= number of items; Min= minimal value manifested on the scale; Max= maximal value manifested on the scale; M= arithmetic mean; SD= standard deviation; Sk= skewness; Ku= kurtosis.

Table A3

Descriptive statistics of the subscales of the disturbance scale

Subscale	N	Min	Max	M	SD	Sk	Ku
Pseudoneurological (N=398)	9	9.00	27.00	12.22	4.27	1.57	1.79
Cardiovascular (N=409)	3	3.00	9.00	4.19	1.55	1.32	1.09
Muscular (N=409)	2	2.00	6.00	2.77	1.09	1.30	.81
Respiratory (N=403)	3	3.00	15.00	4.53	1.69	1.48	3.93
Gastrointestinal (N=399)	9	9.00	27.00	12.51	4.10	1.45	2.08
Dermatological (N=406)	3	3.00	9.00	4.13	1.47	1.35	1.47
Pain (N=402)	6	6.00	18.00	9.66	3.03	.70	-.13

Legend: N= number of items; Min= minimal value manifested on the scale; Max= maximal value manifested on the scale; M= arithmetic mean; SD= standard deviation; Sk= skewness; Ku= kurtosis.

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Однос између стратегија и техника учења, анксиозности и психосоматских симптома ученика VIII и IX разреда основне школе

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Апстракт Циљ овог рада је испитивање учесћалости психосоматских симптома ученика и њихову повезаност са стрављењима и техникама учења. Такође, испитивање анксиозности као особину личности и њен посреднички однос између стрављења учења и психосоматских симптома. Теоријски оквир рада је самоређулисано учење које повезује когнитивне, мотивацијске и емоционалне аспекте учења. Узорком је обухваћено 420 испитаника просечне узраста 13,7 година (47,2% ученица). Дескриптивном анализом је утђановљено да су најучесћалији психосоматски симптоми тегороинтеситални, тсеудонеуролошки и симптоми бола/осећаја слабости. Резултати истраживања указују на то да су стрављење учења у негитивној вези и са фреквенцијом ($r = -.22$, $p < .01$) и интензитетом омећања психосоматским симптомима ($r = -.17$, $p < .01$), као и анксиозности ($r = -.21$, $p < .01$). Анксиозност као особина личности има значајан медијациони ефекат између стрављења учења и фреквенције психосоматских симптома ($P^2 = .208$, $b = -.437$, $SE = .219$, 95% ЦИ $[-.75, -.21]$) и стрављења учења и интензитетом омећања психосоматским симптомима ($P^2 = .111$, $b = -.363$, $SE = .126$, 95% ЦИ $[-.66, -.15]$). Медијациони ефекат анксиозности у релацији техника учења – фреквенција/интензитет омећања психосоматским симптомима није утђановљен. Резултати истраживања указују на потребу за обуком ученика у самоређулисању процеса учења и примени ефикасних стрављења учења од раног школског узраста како би се смањео ризик од појаве психосоматских симптома.

Кључне речи: стрављење учења, техника учења, самоређулисано учење, анксиозност, психосоматски симптоми.

Отношение между стратегиями и техниками обучения, тревожностью и психосоматическими симптомами у учащихся VIII и IX классов основной школы

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Резюме

Целью данной работы является исследование частоты психосоматических симптомов у учеников и их связь со стратегиями и техниками обучения. Кроме того, исследуется тревожность как особенность личности и ее посреднические отношения между стратегиями обучения и психосоматическими симптомами. Теоретическими рамками работы является саморегулируемое обучение, связывающее когнитивные, мотивационные и эмоциональные аспекты учебной деятельности. Исследованием охвачено 420 учащихся, средний возраст которых составил 13,7 лет (47,2 % учениц). Deskriptivnim анализом установлено, что наиболее частыми психосоматическими симптомами являются гастроинтестинальные, псевдоневрологические и симптомы боли / чувства слабости. Результаты исследования показывают, что стратегии обучения отрицательно связаны и с частотой ($r = -.22, p < .01$), и с интенсивностью возникновения психосоматических симптомов ($r = -.17, p < .01$), и с тревожностью ($r = -.21, p < .01$). Тревожность как особенность личности оказывает значительное опосредующее воздействие между стратегиями обучения и частотой появления психосоматических симптомов ($R^2 = .208, b = -.437, SE = .219, 95\% CI [-.75, -.21]$) и стратегиями обучения и интенсивностью психосоматических симптомов ($R^2 = .111, b = -.363, SE = .126, 95\% CI [-.66, -.15]$). Посреднический эффект тревожности по отношению к техникам обучения – частоте/интенсивности возникновения психосоматических симптомов не установлен. Результаты исследования указывают на необходимость обучения учащихся саморегуляции процесса обучения и использованию эффективных стратегий обучения, начиная с раннего школьного возраста, с целью снижения риска возникновения психосоматических симптомов.

Ключевые слова: стратегии обучения, техники обучения, саморегулируемое обучение, тревожность, психосоматические симптомы.