

REVIEW

Stress and health-related behaviour, personality characteristics and blood pressure in older school children

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Abstract

Background: Frequent stress contributes to physical and psychical disorders already in school-age children. Subjective evaluation of stress level is considered adequately informative for differentiating eustress and distress.

Objectives: Assessment of the extent of stress and connections with health-related factors and characteristics is a precondition for health promotion and stress prevention in school children.

Methods: In a cross-sectional study we analysed data from 213 older school children (107 boys and 106 girls) aged 10 and 14 years. Use was made of a self-evaluation questionnaire to assess the stress level, behavioural factors, feeling of health, 7-day report of data on diet and physical activity, J.E.P.I. test (Eysenck, 1971) evaluating neuroticism and extroversion. Sport activities were expressed as FIT value (product of frequency, intensity and time of exercises) and daily energy balance as ratio of average daily energy intake and energy expenditure.

Results: The girls felt stress more frequently than boys (38.7 % vs 24.3 %, $p < 0.03$). School stress was significantly more frequent than home stress. The stressed students more negatively evaluated their health and physical performance. The relation between stress degree and neuroticism score was confirmed. Sport and physical activities were significantly lower in boys with high stress load. Any closer relations between frequency of stress and health risk behaviour, sleep as well as school performance and blood pressure failed to be confirmed.

Conclusion: The results have indicated the need of lowering school stress. One of effective ways is to promote physical activity in the life of children. (Tab. 3, Fig. 1, Ref. 24.)

Key words: stress, schoolchildren, health-related behaviour, personality characteristics, preventive health care.

The life-style is determined by a complex of external and internal factors. Nutritional habits, level of physical activity, healthy-hygienic and psycho-hygienic habits are among the basic indicators of life-style, which significantly influence health of an individual or the population.

The dominant concept of WHO definition of health is the status of physical, psychical and social well-being. Acceptance of bio-psycho-social conception of health and diseases has proved to be a basic assumption of complex health care (Zikmund, 1993).

High stress level in life invades in various degrees the well-being and self-content, which can contribute not only to negative changes in health-related behaviour, but also to psychical and physical disorders (Gil et al., 1987; Medved'ová, 1993; Šimko, 1998).

Stress represents a severe psychosocial problem already in many school-age children who are able to define it (Havlinová and Schneiderová, 1995; Plourde, 1994).

The aim of the present study was to evaluate the extent of stress feeling at school and at home in older school children and assess the relations between stress degree and selected health-related behavioural factors, personality characteristics and physiological parameter — blood pressure in older scho-

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of children and to estimate possibilities of prevention and intervention.

Material and methods

The sample consisted of 213 older school children aged 10 and 14 years (107 boys and 106 girls), from two regions of Slovakia with a balanced number of boys and girls in each age and locality.

In a cross-sectional study the following values were assessed: the degree of school stress and stress at home, health risk behaviour, habits, evaluation of health and physical performance on the basis of a self-evaluation questionnaire. School children monitored their diet and exercise and all physical activities for 1 week.

Sport activities were expressed as FIT value — product of frequency, intensity and time of exercises of school children during one week. A seven-day recording of food consumption and all daily activities was used for evaluating of the daily energy balance, which was calculated as ratio of energy intake and energy expenditure expressed in percentage. School performance was expressed by the average of grades. The standard method was used to measure blood pressure.

Selected personality characteristics — neuroticism and extroversion were determined by the test J.E.P.I. It is based on the self-evaluation scale estimating the level of emotional instability, anxiety and rigidity (Eysenck, 1971). The programmes EPI Info 6 and Microsoft Excel were used for statistical analyses.

Results

The numbers of school children, which are often stressed at school, at home or at both school and home are shown in the Figure 1. On the whole, 31.5 % of school children have declared frequent and very frequent stress load. This number was significantly higher in girls (38.7 % of girls, 24.3 % of boys, $p < 0.03$). More students noticed stress load situations at school, than at home (boys 17.8 % vs 3.7 %, girls 24.5 % vs 9.4 %), 3 % of boys and 5 % of girls experienced frequent stress at school and also at home.

Students with a high degree of stress perceived their health status and physical performance in more amount negatively (Tab. 1).

Health-risk behaviours in smoking and alcohol drinking have not revealed any close relationship with the degree of stress in school children of this age.

Account of boys and girls, with multiple drinking alcohol and smoking have been shown unfavourably high (Tab. 1).

Boys with a high degree of stress scored lower in FIT-value, but their FIT — values were on the whole significantly higher than those in girls. There is also a tendency in these boys to have higher positive energy balance — higher ratio of daily energy intake to energy expenditure (Tab. 2). That means, the more stressed boys declared less sport and physical activities. These relations were not confirmed in girls. Similar results came out from a comparison of the degree of stress and other hobby activities and private classes.

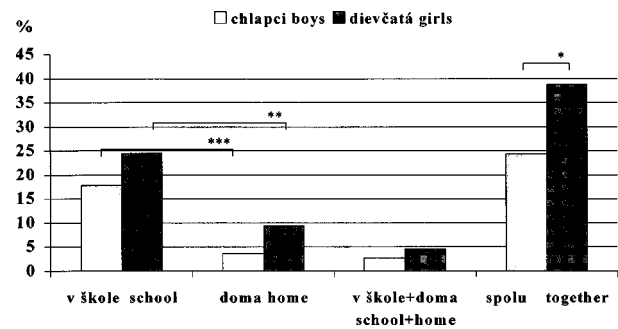


Fig. 1. Number of often stressed school children. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

The average duration of sleep was 8.4—8.9 hours in the groups, without evident differences between girls and boys and according to grade of stress.

School performance — the average of grades did not differ according to stress degree (Tab. 3). Neuroticism was found to be in a close positive relationship to stress feeling in boys and girls. Relationships between extroversion and stress feeling failed to be confirmed.

The physiological parameters of systolic and diastolic blood pressure did not differ according to stress degree either in boys or in girls.

Discussion

Our results revealed that school children suffering frequently from stress differ in several behavioural and personal features from those without such stress at school or at home.

Tab. 1. Occurrence of negative subjective indicators and risk behaviour according to stress degree.

Parameter	Group	Number of schoolchildren (n) %		
		Stress - often, very often	Stress - sometimes, rarely, none	p value
Negative self-evaluation of health	Boys	(8) 30,9	(7) 9,1	0,02
	Girls	(23) 41,5	(11) 16,9	0,006
Negative self-evaluation of physical performance	Boys	(4) 15,4	(7) 8,6	n.s.
	Girls	(14) 36,6	(9) 13,8	0,007
Smoking	Boys	(10) 38,5	(41) 50,3	n.s.
	Girls	(13) 34,1	(21) 30,8	n.s.
Drinking alcohol	Boys	(15) 57	(45) 55	n.s.
	Girls	(27) 68	(38) 56	n.s.

Tab. 2. Average value of behavioural factors according to stress degree.

Parameter	Group	Average value of parameters						
		Stress - often, very often			Stress - sometimes, rarely, none			p value
		n	x ₁	s _{x1}	n	x ₂	s _{x2}	
FIT-value (score)	Boys	26	1,5	1,2	81	2,3	1,6	0,02
	Girls	39	1,0	0,9	67	1,1	0,8	n.s.
Energy balance (%)	Boys	26	103	42,3	81	80,7	30,5	n.s.
	Girls	39	95	35,3	67	100,6	30,7	n.s.
Sleep (hrs)	Boys	26	8,7	1,3	81	8,4	1,1	n.s.
	Girls	39	8,5	1,1	67	8,9	1,3	n.s.

Tab. 3. Average value of selected characteristics of personality and BP according to stress degree.

Parameter	Group	Average value of parameters						
		Stress - often, very often			Stress - sometimes, rarely, none			p value
		n	x ₁	s _{x1}	n	x ₂	s _{x2}	
Average of grades	Boys	26	2,2	0,8	81	2,1	0,8	n.s.
	Girls	39	1,7	0,6	67	1,6	0,6	n.s.
Neuroticism (score)	Boys	26	15,1	4,1	81	11,9	4,0	0,001
	Girls	39	15,8	4,1	67	11,9	4,9	0,001
Extroversion (score)	Boys	26	15,1	4,3	81	17,2	3,2	n.s.
	Girls	39	15,6	3,9	67	16,0	3,8	n.s.
Blood pressure (mmHg)	Boys	26	110/69	11,9/8,9	81	109/70	14,7/10	n.s.
	Girls	39	105/70	12,4/9,2	67	104/71	13,4/10,1	n.s.

Frequent stress feeling became reflected in a subjectively negative evaluation of health and physical performance. Psychic stress correlates with somatic responses as decreasing performance and increasing fatigue (Sarmany, 1994)

Our analyses showed no significant relations between stress degree and health risk behaviour. Smoking and alcohol drinking in school-age children are directly influenced by relationships with parents, peers and by in-school experiences (King et al., 1996).

The range of sport and overall physical activity (FIT-value) was better in boys with a lower stress degree. We can here consider the generally accepted positive influence of exercise on psychic well-being and compensation of psychic load imposed upon children by the teaching process.

Sport activity of children promotes the development of per-

sonal features and abilities creating conditions for the formation of psychic resistance (Krejčí and Man, 1990).

The results of sports activity were confirmed by data on energy balance. A higher average daily energy intake and significantly lower physical activity (lower energy expenditure) were identified in the group of boys with frequent stress. This was noted in the positive daily energy balance. Physical activity in girls is significantly lower, but the energy balance did not differ from that in boys. The lower energy expenditure in girls was followed by a lower energy intake through food.

Nowadays not only psychically demanding situations as increasing risk of overload are identified in school children, but also excessive static load in the course of the lessons, leisure time at television viewing, computer and other sedentary hobbies (King et al., 1996).

No close relation between stress and time of sleep was revealed. Sleep in school-age children constitutes a very important basic rest element in the daily regime. Our previous research showed a significant decrease in sleep duration in our school-age children over the last 15 years (Ševčíková et al., 2000).

An increased incidence of certain groups of diseases and alterations of functions has been diagnosed in school children, which may be assumed to be closely associated with the psychical and physical load they are exposed to in the teaching process.

The neurohumoral response of the organism to a psychically demanding examination evaluated by adrenaline excretion was significantly higher than that seen in a situation of psychically undemanding schoolwork. Children with a higher score of neuroticism had a higher rate of adrenaline excretion. This finding was not confirmed in cases of undemanding work (Ševčíková et al., 1984).

Frequent examinations, time pressure at work, inappropriate school demands, improper methods of examination with social pressure by teachers and parents are dominant in the psychic stress of school children (Havlíková and Schneidrová, 1995; Kontrová et al., 1991).

A high significant relation between feelings of stress and neuroticism score has been confirmed which is in conformity with data by other authors (Košč, 1989; Saklofske and Kelly, 1995).

Neuroticism belongs to personality characteristics influencing the level of school load. It has a multifactorial origin in which psychosocial conditions in school and in family play an important role (Árochová and Ševčíková, 2000).

Research results by Ficková (2000) confirmed, that neuroticism and extroversion belong among personality determinants of coping with stress in adolescents. In our results, perceived stress did not show any close relation with extroversion.

The evaluated relationships failed to show differences of school achievement in the stress category. Coping stress is determined by cognitive as well as motivational and emotional features of personality and the psychological importance of a situation (Lazarus, 1993, Ruiselová, 2000; Carson and Bittner, 1994; Sorensen, 1994).

No differences in average blood pressure values were revealed in relation to stress degree. This is subject to the influence of many other factors (Lauer et al., 1991).

Reduction of school stress is possible by the acceptance of the principle of individual approach to boys and girls and to each child in the teaching process.

Preventive care of mental health in school children requires a monitoring of their responses to school strain, detection of children in overload risk and neuroability. Židková (1995) has offered a simple screening method.

Counselling and self-management skills, training programs seem to be an effective intervention procedure (McCarty et al., 1998).

Our results have revealed a high proportion of schoolchildren, mainly girls, which frequently have felt stress at school. The frequently stressed girls and boys evaluated their health and physical performance significantly more negatively. Their average neuroticism score was higher.

The analysis has indicated that sport and physical activity were higher in boys than in girls and were significantly lower in boys with high stress load.

The school stress has been revealed as high risk factor of some school-age children. This represents a specific psychosocial problem in the educational process. The possibilities of prevention leading to an abolishment of the high level of stress from the teaching process reside in identifying and understanding the characteristics, abilities, skills and barriers to healthy behaviour in each child and adolescent as well as using an individual approach to each of them.

The relationships between stress perceiving and selected health-related parameters have indicated the need of reducing school stress as a risk factor for physical and mental health at this age and in next periods of life. One from among the effective ways is to faster physical activity in the life of school children.

Currently the health care of our school children is restricted. This is due to the absence of any school health service. The health education of children is formal and the knowledge of teachers and parents in the area of health promotion of school children is inadequate.

A close co-operation among teachers, parents, physicians, nurses and psychologists seems to be the basic assumption for minimalizing health risks in school children including a reduction of stress in the teaching process.

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