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Coping strategies preferred by adolescents when managing stress in sport − pilot study

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Abstract

The aim of the study, which was carried out as a part of the research grant project "Psychological aspects of managing stress by top athletes in adolescence", was to map the occurrence of psychological aspects of possible overtraining in adolescent athletes in the Czech socio-cultural environment and to verify possible connections between the perceived level of training stress and coping strategies preferred by adolescent athletes, focusing on the relationship between the level of perceived stress and intensity of training. The study also aims to verify basic psychometric characteristics of the used methods for the purpose of follow-up research. A quantitative design was used to carry out this research as well as a combination of three self-assessment methods: Training Distress Scale; Profile of Mood States and Children´s Coping Strategies Checklist. The research file contained 230 respondents aged 14-20 years: 147 boys (64%) and 83 girls (36%). The average age was 16.4 years. The most represented sports were football (N=72; 31%), athletics (N=25; 11%) and ice-hockey (N=17; 7%). Most of the respondents were members of sport clubs (N=177; 77%), 21 athletes were (9%) representatives of the CR in that particular sport and the most numbered group of respondents have been doing the sport for more than eight years (67%). The results showed a statistically significant difference between felt symptoms of overstrain after the training and in the following 24 hours. Respondents most often described the following combinations of emotional states in connection with the perceived stress: anger and depression; depression and tiredness; and confusion and tension. As far as coping strategies are concerned, respondents reached the highest average score in the Active strategy (2.44) and Strategy of avoiding (2.38) scales, which are more often practiced by athletes reporting a higher level of perceived stress. The highest scores were reached by respondents on the Direct problem-solving (M = 2.66) and Cognitive decision-making (M = 2.50) sub-scales.

Keywords: Stress in sport, coping, coping strategies, adolescence.

1. Introduction

Active lifestyle has a lot of advantages for teenagers, since it is an important protective factor against a number of health problems, connected with biological and psychological basis (Allen, Vella, & Laborde, 2015). Research studies have demonstrated that physical activity in adolescence along with regular sport practice has positive impact on a number of key physiological processes (Janssen & LeBlanc, 2010; Stephan, Sutin, & Terracciano, 2014) and physically active individuals even show a relatively lower risk of death (Kodama et al., 2013). Joining physical activities also positively influences mental health of adolescents and it is a significant predictor of a low occurrence of symptoms of depression and anxiety in the subsequent stages of development (Biddle & Asare, 2011; Brown, Pearson, Braithwaite, Brown, & Biddle, 2013), since regular physical activity lowers the level of perceived stress and increases one´s assessment of mental health (Jewett et al., 2014). Apart from health benefits, a positive relationship was found in adolescents between their regular active participation in sport activities and academic performance (Singh, Uijtdewilligen, Twisk, Van Mechelen, & Chinapaw, 2012), which only highlights the significance and positive impact of regular sport activities in that developmental period. However, regular sport activity can also have many negative influences on physical and mental health of adolescents if it is practiced more than is suitable for their current physical and mental state and the present degree of their biological, mental and social development, especially if they do not respect the required amount of necessary regeneration. Negative impacts of sport activities are primarily connected with excessive stress in sport and the subsequent preferred and practiced ways of coping with the stress. The key concept for the presented research is therefore coping as conscious and active manner of dealing with stress, which is practiced in the context of preferred coping strategies. Individual coping strategies are derived from basic reactions of an individual to stress (stressful situation).

1.1. Classification of coping strategies

Coping with stress can be seen from many different perspectives and there are many definitions and models of coping in literature specialised on the subject as well as attitudes to classification of coping strategies (Nicolas, Gaudreau, & Franche, 2011). The presented study uses as its basis the four-factor model of coping with stress designed by Ayers and his colleagues (Ayers, Sandeer, West, & Roosa, 1996). This model represents one of the approaches which are concerned with managing stress in children and adolescents, which is suitable for the aim of the presented study. The authors were inspired by two already existing two-dimensional models: the first model is Lazarus & Folkman (1984), which defines problem-focused coping strategies as opposed to emotion-oriented coping strategies, and the second model is Billings & Moos (1981), which describes active versus passive reactions to stress. According to Ayers and his colleagues, none of the mentioned approaches in their research expressed the data so well as the following model, where concrete strategies of coping fall under each of the four fundamental categories:

1) Active strategy of coping (Cognitive decision-making, Direct problem-solving, Searching for understanding, Positive reevaluation),
2) Strategy of searching for support (Problem-focused support , Emotion-oriented support),

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3) Diversion strategy (Diverting activities, Physical release of emotions), and
4) Strategy of avoiding (Cognitive avoiding, Escapist activities).

There are many factors playing a role in adolescent athletes´ preferences for coping strategies, which are in the end mutually influential[1].

1.2. Coping strategies in adolescence

The development of coping strategies changes during ontogeny and is influenced by biological as well as psychosocial maturation of an individual and his or her present experience with coping with stressful situations. The results of current research studies bring interesting conclusions about coping strategies, stating that in adolescence, the number of adaptive and maladaptive coping strategies grows with age, and that maladaptive strategies (self-blame, escapism etc.) are used by women rather than men (Al-Bahrani, Aldhafri, Alkharusi, Kazem, & Alzubiadi, 2013). Also Wingo, Baldessarini, & Windle (2015) describe gender differences in preferences for coping strategies and highlight that especially in the period of later adolescence women rather than men use emotion-oriented strategies. They further reflect the growth of preference and use of task-oriented strategies in the conclusions of their research study focused on the development of coping strategies in stressful situations in the period of 17-33 years. These strategies, also referred to as problem-focused, and considered adaptive, mainly include active solutions of the problematic situation. The study has also demonstrated that in this stage of development the number of maladaptive emotion-oriented strategies decreases. Adolescents who use more than one coping strategy state fewer perceived problems (school-related, personal, emotional, family and health-related), which shows that the use of a broad scale of coping strategies has a protective role.

1.3. Coping strategies in the context of managing stress in sports

Coping is an integral part of psychological preparation for training and sporting activity itself (competition, race, etc.), and at the same time, it is an integrated part of coping with possible successes and failures in sport and all the obstacles in the context of a sporting career of each individual, e.g. also possible rehabilitation after an injury. The optimal use of appropriate coping strategies has a positive effect on the development and support of adolescent athletes´ self-confidence, and, ideally, also on the growth of his or her performance through adopting new behavioral patterns in the context of coping with all range of stressful situations connected with a sporting performance (Nicolas, Gaudreau, & Franche, 2011). Research studies have demonstrated that athletes use various coping strategies to manage stress connected with sporting preparation and competitions/matches (Gaudreau, Nichols, & Levy, 2010). Sporting performance of each adolescent individual and especially his or her stability, or, ideally, incessant gradual performance progress is influenced by a number of factors in the context of coping. First and foremost, they are the characteristics of the stress perceived by an athlete, when a manageable stressor can have a stimulating effect on the final sporting performance, but too much of

[1] Factors influencing reactions to stress can be divided into inner and outer factors (Klose & Kebza, 2009). Some of the inner factors are many psychological phenomena, like personality traits, locus of control, resilience, sense of coherence, hardiness, dispositional optimism, etc. Some of the outer factors, apart from broader socio-cultural influences, are mainly social support provided by people in one´s surroundings (family, friends, specialists, etc.)

it can influence the performance in a negative way, which could be reflected also in the coping strategies subsequently adapted and preferred by an adolescent individual − these can change depending on the pressure/seriousness of the situation (Kowalski, Crocker, Hoar, & Niefer, 2005). Many authors describe the key stressogenic situations in athletes´everyday preparation as, for example, permanently disrupted daily routines, higher responsibility without the possibility of decompensation, permanent correction of emotions, etc., which, to a certain extent, differ in individual and team sports (Stackeová, 2012) as well as during sporting preparation, or season (Tamminen & Holt, 2010).

1.4. Stress in sport

Reactions to stress in sport in adolescents differ significantly from mature adult individuals, since they are still physically and mentally developing. To reach optimal sporting performance, it is the right combination of training methods reflecting developmental needs of adolescents that is indispensable in this developmental period. The concept of all sporting preparation needs to be adequately adjusted to the particular stage of development of the athlete in order to minimize the risk of injuries and overtraining, and to maintain participation in sport in the future (Burgess, Naughton, & Norton, 2012). Lehnert, Novosad, Neuls, Langer, & Botek (2010) present two types of stress in sport: the inner stress (the amount of inner stress is defined by how strong the reaction of organism is to practiced sporting activities) and the outer stress (the amount of outer stress is defined by the intensity of stress). The outer stress has two constituents − qualitative (volume) and quantitative (intensity). Considering the stated facts, it is very difficult to determine what level of sporting preparation is beneficial for an individual and what amount of stress already results in overtraining (Brenner, 2007), which is usually caused by insufficient regeneration and other sources of excessive stress, which can lead to maladaptive reaction of organism in the form of overstrain (Matos, Winsley, & Williams, 2011). Overtraining is accompanied by higher after-training tiredness, the classification of which differs in various authors. For the purpose of the presented study, we use the classification of tiredness used by many foreign authors (Matos, Winsley, & Williams, 2011; Kreher & Schwartz, 2012; Meeusen et al., 2013):

1) FOR (functional overreaching) − short-term overstrain,
2) NFOR (nonfunctional overreaching) − long-term overstrain,
3) OTS − overtraining syndrome

Table 1. Terminology of attitude to overtraining by the European College of Sport Science
(Meeusen et al., 2006 according to Kreher & Schwartz, 2012)

Title	Definition	Performance limits	Result
Functional overreaching (FOR)	Includes a higher training preparation resulting in temporary decrease in performance and increase in performance after relaxation.	Days − weeks	Positive (supercom-pensation)
Nonfunctional overreaching (NFOR)	Intensive training leads to long-term decrease in performance, but energy is fully restored after sufficient relaxation and is accompanied by more intense psychological and/or neuroendocrinological symptoms.	Weeks − months	Negative (considering the symptoms and loss of training time)

Overtraining syndrome (OTS)	Includes extreme non-functional overstrain with a long-time decrease in performance (>2 months); it has more serious symptomatology and physiological maladaptation (influencing the mental state and neurological, endocrine and immunological systems) as well as other stressors inexplicable by different illnesses.	Months	Negative (considering the symptoms and possible end of sporting career)

Overstrain (FOR) is perceived as accumulated training stress, which leads to lowering the performance, requiring days to weeks of regeneration, but after sufficient relaxation can lead to improvement of the performance. However, if the strain is extreme and it is connected with additional stress, it can easily lead to overtraining syndrome (OTS) (Meeusen et al., 2006). Recent studies highlight not only the significance of physiological stress, but also psychological and/or social stressors in the process of overstrain transforming into overtraining syndrome (Meehan, Bull, Wood, & James, 2004), which proves the significance of using suitable coping strategies in this context.

2. Problem statement

Understanding mechanisms of managing stress in sport is significant from the perspectives of many research disciplines, as it overlaps into many fields. In psychology, they are general (developmental psychology) as well as applied psychological disciplines (psychology of health and sport psychology). Nevertheless, researching managing sport stress in the context of coping strategies preferred by adolescents is also beneficial for athletes themselves, since it helps them identify the symptoms and level of risk of excessive training strain as well as the occurrence of a possible overtraining syndrome and informs them about the necessity of learning as broad a spectrum of coping strategies as possible. The research results in the given field are also useful for assessment, management and education of athletes (Kreher & Schwartz, 2012), since tiredness along with the level of perceived physical and mental well-being can provide important information about how ready they are to train and compete, which is beneficial for their performance (Gastin, Meyer, & Robinson, 2013).

3. Purpose of the study and research questions

The primary purpose of the study was to map the occurrence of possible overtraining in athletes in the developmental period of adolescence in the Czech socio-cultural environment and to explore possible connections between the perceived level of training strain and preferred coping strategies, or to verify if this relationship exists. In this context, we have attempted to verify if there is a relationship between the level of perceived strain and intensity of training preparation and if there is possibly also a gender difference in the degree of perceived training strain.

The secondary aim of the research was to verify the basic psychometric qualities of the Czech shortened version of Profile of Mood States and the proposed Czech translation of Training Distress Scale, where the psychometric methods are not of Czech origin. The Czech shortened version of the

POMS questionnaire was only used on Czech population once in a research study of university students (Stuchlíková et al., 2005), not of adolescents, and the TDS questionnaire method presented for the purpose of this study does not still have an appropriate equivalent among Czech methods.

4. Method

The quantitative research design was carried out with the help of one-time questionnaire survey administered by the pencil-paper method. First, the test battery determined selected information about respondents relevant to the research aim − practiced sport activities, their frequency, type of preferred sport (individual or team), number of years for which the respondents have been doing the sport and the level of competition, if applicable, (free-time activity, sport club or representation). Then, while following the basic ethical conditions of research, three self-assessment questionnaire research methods were used (see further). The data was collected with the help of conventional sampling in sport clubs training the given age category, sport high schools, and in the last years of sport classes of elementary schools. Subsequently, the data was presented to the directors of the relevant institutions with the help of educational advisors.

4.1. Methods used

The Training Distress Scale (TDS, according to Grove, Main, Partridge, Bishop, Russell, Shepherdson, & Ferguson, 2014), was administered twice in the tested battery in order to record subjectively perceived strain immediately and within 24 hours following a demanding sport activity. It was a 19-item questionnaire taken from the research study by Grove et al. (2014). TDS is based on the evaluation of distress symptoms related to acute overtraining, which was identified by Fry et al. (1994) on a five-point bipolar scale (not at all − a little − medium − quite a lot − a lot). Cronbach´s alpha of the method is, according to Grove et al. (2014), 0.82. The inner consistency of individual questionnaire methods in the presented study was the following: immediately after the training 0.85 and 24 hours after the training 0.87.

The Profile of Mood States (POMS, McNair, Lorr, & Doppleman, 1992, edited by Stuchlíková, Man, & Hagtvet, 2005) is based on the original 65-item version of Profile of Mood States (POMS: McNair, Lorr, & Doppleman, 1971), a method used to profile emotional states and moods. The questionnaire used in the presented study is an abbreviated Czech 37-item version of the method. The respondent should assess the provided adjectives describing affective states on a 5-point intensity scale (not at all − a little − medium − quite a lot − a lot). In all the versions of POMS, the present mental state is determined with the help of six dimensions defined by several adjectives: T=Tension, Anxiety − somatic tension,which does not have to be observable (tense, irresistible, nervous); D=Depression, Dejection − states with tinge of depression accompanied by a feeling of personal inadequacy (sad, useless, despondent, etc.); A=Anger, Hostility − states of anger and antipathy towards others (annoyed, mad/angry, irritated, enraged, etc); V=Vigor, Activity − vigor, energy, to a certain extent even non-specific positive emotions (full of life, active, cheerful, etc.); F=Fatigue, Intertia − flaccidity, indifference, lack of energy (worn out, tired, exhausted, etc.); C=Confusion, Bewilderment −

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confusion, cognitive ineffectiveness connected with the inability to control concentration (disoriented, unable to concentrate, etc.). Shachamová (1983) claims the inner consistency of individual scales in the abbreviated version is in the range of 0.80 - 0.91. The reliability (Cronbach´s alpha) in the presented study was identified in the range of 0.75 - 0.89.

The Children´s Coping Strategies Checklist (Ayers, Sandler, West, & Roosa, 1996) was selected as optimal for its range and suitable form, since the questions are concrete and very clearly formulated. In the 45 items of the method, respondents complete the sentence: "If I have a problem ..." and answer questions on a 4-point scale (almost never − sometimes − often − almost always). The questionnaire was based on a 4-factor model of coping, and each of these factors (active coping strategies, strategies of seeking support, disrupting strategies and strategies of avoiding) include several manners of coping with stress. Ayers and his colleagues (1996) state that the reliability of individual scales of the CCSC method is between 0.51 and 0.72. In the context of our research, the reliability of individual scales (Cronbach´s alpha) was between 0.35 and 0.74. When only focusing on 4 basic factors (active strategies, strategies of seeking support, diversion strategies and strategies of avoiding), reliability was 0.62 – 0.85, which are values that can be considered satisfactory.

4.2. Research file

The research file after clearing the research data consisted of 230 respondents aged 14-20 years: 147 boys (64%) and 83 girls (36%). The average age was 16.4 years, the standard deviation was 1.9 and the median was 16 years. The most frequently represented age category was 15 years (23%). Respondents practiced sport activities with very differing intensity − from recreational athletes practicing physical activity only as a part of physical education and their own irregular sport activities in their free time to athletes with regular trainings organized by a club to representatives who plan to continue in their career (or are already practicing it) at a professional level. Nevertheless, all the respondents are in close contact with sports, and based on the above mentioned definitions of sport, we can call them "athletes" (podle Tod, Tchatcher, & Rahman, 2012).

5. Findings

First, we present selected descriptive statistics, and it is obvious from the distribution of respondents according to the types of sport activities that a large majority of respondents was in the category of team sports (58%).

Table 2. Representation of respondents according to the type of sport

Sport type	Frequency	Relative frequency
Individual	58	25%
Team	134	58%
Both types (more than one sport)	31	14%
Sport only as a part of PE	7	3%

The most frequently represented sport was football (N=72; 31%), then there was a high frequency of respondents practicing athletics (N=25; 11%) and ice-hockey (N=17; 7%). Most respondents are members of sport clubs (N=177; 77%), 21 athletes (9%) are representatives of the Czech Republic in the particular sport. The most frequent group of respondents has been practicing the sport for more than 8 years (67%).

Table 3. Duration of practicing a particular sport

Duration of practicing the sport	Frequency	Relative frequency
less than 3 years	20	8. 7%
3-5 years	23	10.0%
5-8 years	32	13.9%
more than 8 years	154	67.0%
Not completed	*1*	*0.4%*

Respondents were further asked about the intensity of sporting load by filling in the number of hours per day and the number of days per week when they practice sporting activities, which were divided into three categories: a) physical education at school; b) sport activity as a part of training; c) sport activity beyond trainings. In the statistical administration, we further work with the final number of hours devoted to practicing sports in each respondent (the number of hours of practicing sport in a week altogether). The range of weekly sport load varied between 3 hours to the maximum of 44.5 hours in the researched file2. The average value was 14.2 h, the median was 14.0 h and the standard deviation was 6.6. The greatest number of respondents varied between the values of 6-21.5 hours of sporting activity per week.

5.1. Perceived stress in sport

Respondents in the test battery filled in twice the Training Distress Scale (TDS) method with different instructions − the first administration (TDS_1) learned which symptoms of overstrain respondents usually feel immediately after a demanding training, and the second administration (TDS_2) was focused on the symptoms felt in the 24 hours following a demanding training. Respondents answered on a 5-point scale (not at all − very). The questionnaire method is one-dimensional; the overall value of the level of perceived stress was computed by averaging the total of raw scores from the test, especially for TDS_1 and for TDS_2. First, we did correlation analysis of TDS tests reflecting symptoms felt immediately and 24 hours after stress. The relationship between the tests was very close (r = 0.73) at 1% level of significance. Subsequently, with the help of a pair t-test, we analyzed the difference between the results in TDS_1 and TDS_2 – i.e. the difference between the symptoms of overstrain felt immediately after the training and in the following 24 hours. This difference was proved to be statistically significant at 1% level of significance (t= 11.40; sv= 229).

Another administered method, Profile of Mood States (POMS), has, according to Stuchlíková, Man, & Hagtvet, 2005, six factors described in 4.1. When processing the research data, we used values

[2] We do not include two respondents who did not answer the question.

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for individual scales, or the total method value (POMS_Mean), computed by averaging the total of raw scores of individual scales. The correlation analysis of individual scales among each other proved that there is not the assumed positive linear relationship in most POMS scales (only in the correlation of scales A and D; D and F; and C and T), and therefore we used Spearman´s correlation coefficient. The closest relationship was between the scales anger (A) and depression (D), depression (D) and tiredness (F), confusion (C) and tension (T). The vitality scale (V), expressing to a certain extent positive emotions, showed very low up to negative correlation with all the other scales. The explanation is probably a different nature of the items in comparison to other items in the test in the meaning of positive emotions, even though in reverse scoring the values should show results equivalent to other scales.

Table 4. Mutual correlation of the POMS method scales (Spearman´s coefficient)

	POMS_A	POMS_F	POMS_D	POMS_T	POMS_V	POMS_C
POMS_A	1					
POMS_F	0.35**	1				
POMS_D	0.73**	0.47**	1			
POMS_T	0.65**	0.40**	0.69**	1		
POMS_V	-0.03	0.14*	0.12	-0.09	1	
POMS_C	0.61**	0.44**	0.59**	0.72**	-0.09	1

* Correlation at the level of significance p<0.01
** Correlation at the level of significance p<0.05

Further on, in the context of verifying the method for the needs of follow-up research, we examined if the above mentioned methods for determining the level of stress correlate with each other. The correlation analysis of data revealed a medium to close relationship between the used methods, which shows a very similar focus of both methods.

Table 5. Correlation of methods for measuring the level of perceived stress in sport (Pearson´s coefficient)

	TDS_1	TDS_2	POMS_Mean
TDS_1	1		
TDS_2	0.73**	1	
POMS_Mean	0.60**	0.53**	1

** Correlation at the level of significance p<0.05

5.2. Strategies of coping with stress

We learned the choice of preferred coping strategies with the help of Children's coping strategies checklist (CCSC). The outcome of the questionnaire are scores of four factors: active coping strategies, strategies of searching support, diversion strategies and strategies of avoiding (Ayers et al., 1966). Each factor includes several other sub-scales which are described in 1.1 Respondents showed the average score on the Active strategies (2.44) and Strategies of avoiding (2.38) scales. By using a pair t-test, we

analyzed the difference between individual scales based on the order of averages. There was no statistically significant difference between the Active strategies scale and the strategies of avoiding scale. A rather small average score was found in the Diversion strategies scale, which is statistically significantly different from the Strategies of avoiding scale at the 1% level of significance (t= 7.63; sv= 229). It was followed by the Diversion strategies scale with the lowest score, statistically significantly differing from the Diversion strategies at the level of significance p<0.001 (t=8.28; sv= 229). Respondents reached the highest scores on the Direct problem-solving (M = 2.66) and Cognitive decision-making (M = 2.50) sub-scales. Subsequently, we attempted to determine mutual correlations of individual scales − based on the graphic visualization in scatter graph, we found a predicted positive linear relationship in all the scales. Therefore, we present Pearson´s correlation coefficient.

Table 6. Mutual correlation of CCSC scales (Pearson´s coefficient)

	Active strategies	Searching for support	Diversion strategies	Strategies of avoiding
Active strategies	1			
Searching for support	0.48**	1		
Diversion strategies	0.40**	0.32**	1	
Avoiding	0.51**	0.28**	0.49**	1

** Correlation at the level of significance p<0.01

5.3. Connection between the level of perceived stress and preferred coping strategies

The relationship of coping strategies (on the four above mentioned scales) with perceived stress, i.e. with the results of individual methods measuring the level of perceived stress (TDS_1, TDS_2 and POMS) was determined by Pearson´s correlation coefficient.

Table 7. Correlation of the level of stress and coping strategies (Pearson´s coefficient)

	Active strategies	Searching for support	Diversion strategies	Avoiding
TDS_1	0.053	0.048	0.139*	0.223**
TDS_2	0.019	0.095	0.107	0.264**
POMS	-0.069	0.092	0.039	0.182**

** Correlation at the level of significance p<0.01.
* Correlation at the level of significance p<0.05.

Statistically significant relationships at 1% level of significance were found in all three methods (TDS_1, TDS_2 and POMS) with strategies of Avoiding, in the case of TDS_1 at 5% level of significance with diversion strategies; nevertheless, the described relationships are not very close. The level of perceived stress detected from all the three tests is therefore connected with the preference for the strategy of avoiding at the level of significance p< 0.01. The results thus verify the relationship of the level of perceived stress and the choice of the strategy of avoiding (including the cognitive avoiding and escapist activities sub-scales).

The research file was subsequently divided into two groups based on the level of perceived stress (especially for individual methods) so that we could, with the help of t-test for independent selections, compare the differences of averages with preferences for coping strategies in the discovered significant

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relationships. The file was divided according to average values of reported stress in the given methods into Group 1 (with values under the overall average including the average) and Group 2 (with values above the overall average). Table 6 presents the results of t-test analyzing the differences in the preference for the coping strategy of Avoiding based on the level of perceived stress.

Table 8. Preference for the strategy of Avoiding based on the level of perceived stress

Strategies of avoiding	Group	N	Average	t	sv	p
TDS_1	1	128	2.29	-2.777	228	0.006
	2	94	2.49			
TDS_2	1	138	2.26	-4.175	228	0.000
	2	92	2.56			
POMS	1	133	2.32	-2.063	228	0.040
	2	97	2.47			

Strategies of avoiding are more often chosen by the group with a higher level of perceived stress (Group 2). In TDS methods, these results are significant at the level of significance $p<0.01$ and in the POMS method at the level of significance $p<0.05$.

5.4. The connection between the level of perceived stress and the intensity of training preparation

The intensity of training preparation was represented by the overall score of sport activity, i.e. the total of hours in a week which the respondent regularly spends on doing sport as a part of trainings and beyond trainings. The relationship between perceived stress and the intensity of training was determined by Pearson´s correlation coefficient. A positive correlation was identified only in the POMS method and it was relatively low.

Table 9. The correlation between perceived stress and intensity of training preparation

	TDS_1		TDS_2		POMS	
	r	p	r	p	r	p
Sport training preparation	-0.76	0.254	-0.95	0.152	0.41	0.533

However, we could not find any statistically significant differences between groups based on the intensity of training load at the level of perceived stress even by the subsequent analysis of difference (the research file was divided into three groups based on the intensity of training − the athletes with less than 10 hours of training per week were in the first group (N = 65; 28.3%); the second group of athletes had 10 - 20 hours of sport activity per week (N = 136; 59.1%), and the third group had more than 20 hours (N = 29; 12,6%)).

6. Conclusions

The inability of coping with stress and strain has been repeatedly shown as a factor which negatively influences sporting performances (Lazarus, 2000). Competitive environment constantly

creates many stressful situations for athletes (Mellalieu, Neil, Hanton, & Fletcher, 2009), which, as well as the conclusions of Anshel, Kang, & Miesner (2010), highlights the importance of research on relationships between the intensity of sport preparation, the level of strain it entails, and coping.

The results of the study revealed a statistically significant difference between the felt symptoms of overstrain immediately after the training and in the following 24 hours. In connection with perceived stress, respondents most frequently stated the following emotional states mutually accompanying each other: anger and depression, depression and tiredness, and confusion and tension, which corresponds with conclusions of other authors (Yeatts & Lochbaum, 2013). We explain the connection between anger and depression by possible following or alternating of these states, when an adolescent athlete balances between outbursts of anger and the subsequent fall into despondency. The depression and tiredness scales have a common apathy and resignation, which either changes into states of sadness, despondency and regret, or is connected with lethargy and perception of one´s own states of inertia and exhaustion. A close relationship between the confusion and tension scales is understood as an inability to concentrate, when an individual is partially confused and partially the confusion changes into restlessness, nervousness and stress, or tension.

As far as coping strategies are concerned, respondents reached the highest average score in the Active strategy and Strategy of avoiding scales. This strategy was more often preferred by athletes who showed a higher level of perceived stress, which can be explained by a possible learned mechanism of escaping problems, not worrying about troubles, but concentrating on the performance. The highest scores were reached on the sub-scales Direct problem-solving (M = 2.66) and Cognitive decision-making (M = 2.50). These results are interesting especially in the context of the given developmental period, of which a preference for these strategies is not typical, as it is described e.g. by Wingo et al. (2015). The development of these strategies and preferences of their use by adolescent athletes can be related to the protective role of sport during the formation of personality, as it was also described by other authors (Kaiseler, Polman, & Nicholls, 2012). This result also corresponds with the findings of other authors who did research on the subject, like Gaudreau, Nicholls, & Levy (2010), who came to the conclusion in their study that athletes prefer and use differing coping strategies to deal with stress related to competitions. A similar conclusion was presented by Nichols & Polman (2007), who specified that if athletes take part in competitions/races, they need to be able to use primarily effective coping strategies with the aim to fulfill the expectations and give a maximum performance, or to improve it. These results therefore also illustrate the significance of the preferred coping strategies for performance in the area where individuals aim to reach important personal goals. The ability to deal with stress by these effective means has, according to Reeves, Nicholls, & McKenna (2009) an important impact on the sporting performance.

As opposed to the conclusions of Matos, Winsley, & Williams (2011) about the relation of insufficient regeneration to a maladaptive response of organism in the form of overstrain and/or overtraining, the results did not confirm a statistically significant relationship between the intensity of sport preparation and the level of perceived stress, which can be explained by a low representation of truly top sport athletes in the research file (9.2%). However, the result could also reflect the conclusions of Birrer, Lienhard, Williams, Röthlin, & Morgan (2013), who postulated that long-term

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sport preparation and repeated extreme stress in sport forms the development of suitable coping strategies, which are then reflected in the way the impact of physical and mental strain related to this intensive long-term sport preparation is perceived. With regard to the fact that 67.0% of respondents from the research file have been doing sport for more than 8 years, such an effect could be expected in them.

6.1. Possible applications of the results of the study and suggestions for further research

A possible application of the results of the study resides especially in the further use of the methods (Training distress scale and Profile of Mood States) which we primarily verified in the Czech socio-cultural environment and proved them to be very suitable and usable for the given area of research, including the developmental period. The Training distress scale method proved to have a good inner consistency in the cases of both administration processes (immediately and 24 hours after the training) − the value of Cronbach´s coefficient α was 0.85 in the first case and 0.87 in the second case. The reliability of the Profile of Mood States method was between 0.75 and 0.92, and therefore it also showed a good inner consistency. A rather low value of Cronbach´s α (=0.75) was found only in the confusion sub-scale (C)[3]. Other uses of the study results are possible in the context of daily sport preparation, where more attention should be paid to the used coping strategies and especially to the support of the desirable coping strategies development.

The results of the study highlight the importance of studying the role sport has as a protective factor in maturation and forming of personality in the period of adolescence in the context of coping strategies. Further research should therefore focus on mapping the connections between the levels of perceived stress with personality traits. Researching connections between the intensity of training with the perceived level of stress in sporting adolescents should then be focused on homogeneous population in the meaning of a similar level of sporting activity (e.g. only representatives, professional athletes at a particular age and in a particular sport, etc.).

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MUNI/A/1042/2015 Psychological aspects of coping with stress in adolescent top athletes.

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[3] The results can be influenced by a lack of clarity of respondents about the meaning of items as well as the focus of adolescent athletes on performance and inability to feel insecurity or confusion. Insecurity, absentmindedness and confusion (which are items filling the confusion factor as regards formulation of adjectives) can be feelings an adolescent cannot afford to have due to coaches, peers/competitors, or especially parents, who are in many cases strict with the sporting individual, and especially at this age force him or her to firmness and setting of clear goals.

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