

Perceived Stress, Coping Styles and Mindfulness as Predictors of Students' Self-Reported Health Behaviors

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Abstract- The main aim of this study was to examine the predictive contribution of Perceived stress, styles of coping with stress and Mindfulness in explanation of partaking in Health Promotion Behaviors, with gender and age as controlled variables. In this study 307 college students from 45 different higher education institutions in Croatia were included. The rate of taking part in health promotion behaviors was assessed using the Health-promotion Lifestyle Profile-II- HPLP-II, levels of perceived stress were assessed using the short version of Perceived Stress Scale- PSS10, and a short version of the COPE (Coping Orientation to Problems Experienced) questionnaire - BriefCOPE was used to assess different styles of coping with stress, while the Mindfulness Attention Awareness Scale – MAAS was used to assess the level of mindfulness. Significant Pearson correlation coefficients were found between Perceived stress, Problem-oriented and Emotion-oriented style of coping, Mindfulness and taking part in Health Promotion Behaviors. According to the results of hierarchical regression analysis, Perceived stress, Problem-oriented and Emotion-oriented styles of coping and Mindfulness have a significant contribution in predicting taking part in Health Promotion Behaviors. Specifically, lower levels of stress, a higher level of Problem and Emotion-oriented styles of coping and a higher level of Mindfulness predict a higher level of taking part in Health Promotion Behaviors by college students. The results of this study may be useful for constructing educational programs and interventions with the aim of spreading the knowledge on many potential benefits of partaking in promotional health behaviors as well as helping both, students and general population, in changing their potentially harmful behaviors or in sustaining their protective health behaviors.

Key words: health promotion behaviors, perceived stress, copying with stress, mindfulness

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Introduction

Today's modern lifestyles often include harmful health behaviors, such as smoking, excessive consumption of alcohol and food, stress and sedentary lifestyles [1] which can lead to a deterioration of the complete “physical, mental and spiritual well-being”, i.e. individual health [2].

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Studies in industrialized countries suggest a link between various chronic diseases and premature mortality with harmful health behaviors [3]. The most vulnerable are the young adults, who, according to research [4-6], often have a range of unhealthy habits and harmful behaviors and who, compared to adults, show a lower level of involvement in behaviors that promote health, health responsibility and stress management [7]. These results indicate a general risk of adverse health effects occurring in the young population [8].

In the modern world, stress is an inevitable term. Since stress can be defined through the prism of subjective experience and subjective response [9], as presented in Lazarus' Stress Theory [10], in an identical stress situation, a person who is in a state of stress can respond in various ways, even by changing behavior. In most cases, people respond to stress in an automated way, using some of their usual responses. Stress can be damaging, leading to health problems and to decrease in quality of life if there is ongoing activation of stress response [11].

Studies have shown that people under high stress and/or in the face of diminished resources to cope with them tend to engage in behaviors potentially harmful to health [12-14], thus smoking more than usual, drinking more alcohol, eating less and/or less sleep [15-18]. Thus, it is evident that harmful health behaviors are associated with higher levels of stress, but some research [19] also demonstrates the association of stress with reduced involvement in promotional health behaviors. Taylor (1991, according to Conner and Norman) [20] states that low-stress situations in young, educated people with better socioeconomic status increase the likelihood that they will engage in behaviors that could improve health. Wolf (1984, according to

Wolf) [21] also demonstrated adverse health behaviors in a sample of college students in terms of decreased physical activity, sleep, and overall level of health.

Stress coping styles, which include the various cognitive, emotional, and behavioral efforts that a person tries to endure, modify, or remove a stressor, mediate between stressful events and their consequences such as anxiety, depression, and psychological discomfort [22-24]. Different ways of coping can lead to positive and/or negative immediate feelings, as well as assessing the quality of the outcomes, and they relate mainly to the social functioning and mental and physical health of the individual [24,25]. According to Lazarus and Folkman [25], we distinguish between problem-oriented coping that involves behaviors and cognition that seeks to eliminate or change the source of stress [26] and emotion-oriented coping that attempts to reduce negative emotions and tension [22,24]. In addition to these dimensions, certain authors [22,27] also emphasize avoidance as a dimension of coping with stress. The American Psychological Society (2013, according to Park and Iacocca) [28] cites exercise, food and alcohol consumption and smoking as the most common ways of coping with stress in their research. Problem-oriented coping is generally thought to contribute to good health, while emotion-orienting coping and avoidance contribute to a person's poor health [29]. Some studies have found a link between certain health behaviors and coping styles, and so the authors [30] report that eating and drinking is associated with avoidance, while exercise is moderately related to problem-oriented coping. Naquin and Gilbert [31] have shown that smokers tend to use emotion-oriented coping more often than non-smokers and ex-smokers, but not

that smoking alone can be considered as a specific coping strategy, as some individuals use it to cope with perceived stressful situation.

Modern psychology has shaped the Buddhist notion of focused consciousness as an approach of increased awareness that involves skillfully responding to encountering various mental processes that contribute to emotional discomfort and the appearance of non-adaptive behavior [32]. According to Kabat-Zinn [33], focused consciousness/mindfulness is a type of consciousness that develops through deliberate, non-judgmental attention to the experiences of the present moment. At the same time, according to Ryan and Deci [34], it plays an important role in freeing the individual from automatic thoughts, habits, and unhealthy behaviors, as well as in accelerating self-regulation of behaviors that in the long term is associated with increased psychological well-being and life satisfaction. Its practice could be useful in promoting increased participation in one's own health care by enhancing engagement and strengthening the individual's internal resources with the aim of optimizing health prevention as well as recovery from illness [35] and reducing risky health behaviors, especially in young people [36], e.g. eating unhealthy foods or avoiding exercise [37]. A study by Roberts and Danoff-Burg [38] found that mindfulness was significantly negatively associated with overeating, sleeping difficulties and higher levels of stress. Other student population studies [39,40] have also indicated the existence of positive effects on the individual well-being, including a reduction in stress levels. Improving life satisfaction, reducing the level of depression, anxiety, sleep problems, and increasing awareness of the negative effects of alcohol consump-

tion are the results achieved by students after attending a mindfulness program as part of a study by Dvořáková and associates [41].

The aim of the study was to examine the predictive contribution of Perceived Stress, Styles of coping with stress, and Mindfulness in explaining involvement in Health Promotion Behaviors, as well as relationships among these constructs. The question was whether involvement in Health Promotion Behaviors could be explained by Perceived Stress, Styles of Coping with Stress (Problem-oriented style of Coping, Emotional-oriented Style of Coping, Avoidance), and Mindfulness.

According to overall research goal, the association between Perceived Stress, Styles of coping with stress (Problem-oriented, Emotional-oriented and Avoidance), and Mindfulness with Health Promotion Behaviors was established. The hypothesis was that Perceived Stress, Emotional-oriented style of coping, and Avoidance would be statistically significantly negatively associated with Health Promotion Behaviors, whereas Problem-oriented style of coping and Mindfulness would be statistically significantly positively associated with Health Promotion Behaviors. The possibility of predicting the amount of involvement in Health Promotion Behaviors based on Perceived Stress and the additional contributions of Styles of coping with stress as well as Mindfulness, with prior control of gender and age was examined too. We expected positive significant predictive contribution of Problem-oriented style of coping and negative significant contribution to Emotion-oriented style of coping and Avoidance in explaining the variance of engaging in Health Promotion Behaviors. We also assumed a statistically significant positive contribution of Mindfulness in explain-

ing the variance of involvement in Health Promotion Behaviors.

Subjects and Methods

Participants

The study involved 307 participants, of which 269 (87.6%) were female and 38 (12.4%) were male, with an average age of 21.87 years (span = 18-26; SD = 1,924), coming from 45 higher education institutions of the Republic of Croatia. The most of them were from the Faculty of Philosophy (24.2%), the Faculty of Law (14.0%), the Faculty of Economics (8.5%), the Catholic University of Croatia (7.2%), the Faculty of Science (5.9%), the Faculty of Medicine (4.6%) and the Zagreb Polytechnic (3.9%), while all others were represented by less than 3%.

Measuring instruments

In conducting this research, we used: Health-Promotion Lifestyle Profile-II; HPLP-II [42], short version of the Perceived Stress Scale-10; PSS10 [15], short version of the COPE (Coping Orientation to Problems Experienced) questionnaire – BriefCOPE [43] and Mindfulness Attention Awareness Scale – MAAS [44]. The instruments, together with a short block of sociodemographic questions (gender, age, name of the faculty or institution of higher education), were compiled into a single instrument used in conducting the research.

Health-Promotion Lifestyle Profile-II [42] was translated by Ruzica Vuger [45] and contains 52 items. The total score or special score for each of the six subscales can be calculated: Health Responsibility, Physical Activity, Nutrition, Spiritual Growth, Interpersonal Relationships and Stress Management.

The Health Responsibilities subscale [46] consists of 9 items that measure an active sense of responsibility for one's own well-being, as well as providing attention, education and information to one's own health. Bouchard, Shepard, Stephens, Sutton, and McPherson (1990, according to Walker and Hill-Polerecky) [47] state that physical activity measures the regularity of engaging in physical activities of varying intensities, whether being planned for health or fitness purposes or as part of daily leisure activities. Ardell (1989, according to Walker and Hill-Polerecky) [47] states that Nutrition measures food selection and consumption, and Dossy, Keegan, Kolkmeir, and Guzzetta (1989, according to Walker and Hill-Polerecky) [47] point out that Spiritual growth is the development of internal resources for achieving inner peace and balance, connectedness, harmony and wholeness, and the development of maximum well-being human potential. The Interpersonal Relations subscale measures the use of non-verbal and verbal communication when sharing thoughts and feelings, for the purpose of achieving feelings of intimacy and closeness within meaningful relationships. Antonovsky (1987, according to Walker and Hill-Polerecky) [47] states that Stress Management measures the identification and initiation of psychological and physical resources to effectively control or reduce tension. The 4-level Likert scale estimates the frequency of these behaviors and life habits, with 1 meaning "almost never", 2 "sometimes", 3 "often" and 4 "regularly". The total result of Health Promotion Behaviors is formed by calculating the arithmetic mean of the individual responses to all 52 questionnaire items [46]. Psychometric characteristics of the questionnaire's original English form [47], shows that it has satisfactory internal

reliability, with the Cronbach α total scale coefficient being $\alpha = 0.943$, while the same internal consistency coefficient for the subscales ranged from $\alpha = 0.793$ to $\alpha = 0.872$. As part of this research, a factor analysis was conducted to verify the stability of the factor structure of this questionnaire. First, the Kaiser–Meyer–Olkin test as sampling adequacy measure and Bartlett test of sphericity were performed and the results showed the suitability of the correlation matrix to perform factor analysis. Following the Walker, Sechrist, and Pender [46] model, factor analysis was performed using the Principal Axis Analysis method with Direct Oblimin rotation and the Kaiser-Guttman retention factor. The analysis obtained thirteen factors that explained 48.33% of the variance, but the factor structure did not prove fully interpretable. After insight into the Scree plot test, factor analysis was performed again with a predetermined number of factors. The six factors extracted this time explained a total of 39.35% of the variance. Examination of the factor structure matrix revealed that items 9, 41 and 50 have very similar factor saturations on the three factors, which is why they were excluded from further analysis. The first factor is called Spiritual Growth, the second is Physical Activity and Nutrition, the third is Health Responsibility, the fourth is Stress Management, while the fifth is called Nutrition. The last, sixth factor is called Interpersonal Relations. Their correlations were also calculated, and since the smaller number of correlations among the factors is greater than $r = 0.3$, it would not be right to assume that there is a hierarchical structure. Since the correlation between the factors makes sense according to their content and since the authors [46] used same type of rotation, we believe that this was justifiably made in this research,

too. Cronbach α coefficient of internal consistency of the total scale in this study is $\alpha = 0.900$, while the same on the obtained factors ranged from $\alpha = 0.548$ to $\alpha = 0.865$.

The Perceived Stress Scale [15] measures the degree to which people evaluate events from daily life as stressful, or how much they assess their life as unpredictable, uncontrollable, and overburdening [47]. In this study, a 10-item scale version of the Croatian language was used [13]. The occurrence rate is estimated on a 5-point Likert-type scale, with 0 being “never”, 1 “rarely”, 2 “sometimes”, 3 “frequent” and 4 “very common”. The total score is formed as the sum of the estimates on all the scale items. The theoretical range of scores is from 0-40, with a higher total score indicating a higher level of perceived stress. Cohen and Williamson [15] found Cronbach’s internal reliability $\alpha = 0.780$, while Hudek-Knežević and associates [13] determined internal consistency type reliability $\alpha = 0.880$. Factor analysis indicated that there were two factors, with the first factor items located in the negative direction, while the second factor items located in the positive direction. Cohen and Williamson [15] considered the stated factor saturation negligible and decided to place all the items under one factor, which explains 48.9% of the variance in total. Hudek-Knezevic and associates [13] in their study also confirmed the one-factor structure of the scale, explaining 44.1% of the variance. The factor analysis of this scale was also conducted as part of this study. The Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett’s test of sphericity have shown that the correlation matrix is suitable for performing factor analysis. The results of the analysis of the main components with Varimax rotation [15] showed the existence of two factors that together explain a total

of 60.46% of the variance; the items located in the negative direction had projections on the first factor, while on the second factor the items were located in the positive direction; all saturations ranged from 0.632 to 0.811. The results obtained are completely in accordance with the results of the authors [15] of the scale, who considered the saturation distribution negligible and decided to place all items on one factor. After reviewing the Scree plot test, a principal component analysis with a predetermined single factor was also performed and it was found to explain 47.7% of the variance, while the factor saturation ranged from 0.541 to 0.857. Reliability was found to be satisfactory ($\alpha = 0.876$).

The short version of stress coping questionnaire [43] was constructed because of the problems that the original Coping Orientation to Problems Experienced (COPE) [27] had because of its item's length and redundancy [43]. For the purposes of this research, an adapted short version of the Croatian Language Stress Questionnaire [49] was used, consisting of 28 items, arranged in a total of 15 subscales, 12 of which were theoretically derived, while the other 3 were subsequently included. The twelve theoretically derived scales are: Positive reinterpretation and personality growth, Active coping, Planning, Acceptance, Restraint, Suppression, Denial, Behavioral disengagement, Mental disengagement, Seeking social support for emotional reasons, Seeking social support for instrumental reasons and Ventilating emotions. The adapted Croatian questionnaire contains three additional subscales: Humor, Alcohol and/or Drug Use and Religion. Factor analysis identified three higher order factors: Problem-oriented coping (Planning subscales, Active coping, Positive reinterpretation, Restraint, Suppression of other ac-

tivities and Acceptance), Emotion-oriented coping (subscales Seeking social support for emotional reasons, Seeking social support for instrumental reasons and Ventilation of emotions) and Avoidance (subscales: Behavioral Disengagement, Mental Disengagement, Denial, Religion, Humor, Alcohol and/or Drug Use) [13]. Estimates are made on a 5-point Likert scale, with 0 meaning "never", 1 "rarely", 2 "sometimes", 3 "often" and 4 "almost always". Results are generated for each subscale, with a higher score indicating a higher frequency of use of a particular type of behavior. According to Hudek-Knezevic and associates [13], these factors have satisfactory internal consistency (Cronbach α ranged from 0.80 to 0.92) on the various subjects samples. In this study, a factor structure check was also performed, after determining that the preconditions for conducting factor analysis were satisfactory. The principal axis method with Direct Oblimin rotation, same as of the authors, was used [43]. The resulting factor structure of 8 factors explaining a total of 54,21% of the variance was not completely clear, but showed subscales tendencies to form higher order factors. Taking this tendency into account, and the fact that the three-factor structure was found in some studies [13], factor analysis was again performed with a predetermined number of factors. An insight into the communalities showed that items 18 and 19 have low communalities, so they were dropped from further analysis [50]. The first factor now includes the Planning, Active Coping, Positive Reinterpretation, Confrontation Coping, Suppression of Other Activities, Acceptance, and Humor subscales. The presence of saturation of the Humor subscale on the aforementioned factor is unexpected, since the theoretically expected saturation was on the third factor, but

since there is no reason to exclude it from the analysis, it remains an integral part of this factor, which is called Problem-oriented coping. Subscales Seeking Social Support for Emotional and Instrumental Reasons and Ventilating Emotions have saturation on another factor called Emotion-oriented copying. The third factor included Mental, namely Behavioral Disengagement, Denial, Religion, and Alcohol and/or Drug Use is appropriately called Avoidance. This three-factor solution was able to explain 41.55% of the variance. From the correlations among the obtained factors it could be seen that the assumption of hierarchical structure among the factors is not justified. However, a review of the contents of the questionnaire might suggest the opposite. The assumption that there is a correlation between the factors is also evident in the factor analysis using the skew rotation conducted by the author of the Carver questionnaire [43]. This same research was used as a starting point for conducting factor analysis on this sample. In addition, an intrinsic reliability test was performed, and they were $\alpha = 0.723$ for the Problem-oriented Factor, $\alpha = 0.891$ for the Emotional-oriented Factor, and $\alpha = 0.676$ for the Avoidance factor. The test results in this study have slightly lower values compared to the coefficients obtained in previous studies, especially for the Avoidance factor, but are still satisfactory.

Mindfulness Attention Awareness Scale – MAAS [44] consists of 15 items, whose content covers cognitive, interpersonal, emotional and physical domains, as well as the domain of general experiences. The Croatian translation of the questionnaire was made by prof. dr. sc. Anita Vulic-Prtoric [51]. Participants were asked to evaluate how often they experienced the experiences described in the item, and to what extent the claims relate to

their actual experiences and not to the experiences they think they should have. The evaluation was made on 6-point Likert scale, with 1 meaning “almost never”, 2 “very rare”, 3 “somewhat rare”, 4 “somewhat common”, 5 “very common” and 6 “almost always”. The total score is formed by calculating the arithmetic mean, taking into account the estimates of all items, and a higher score indicates a higher level of mindfulness. The authors [44] conducted an exploratory factor analysis that provided a one-factor solution, which was confirmed in a later confirmatory factor analysis. The one-factor structure was confirmed in other studies [52,53]. Cronbach α coefficient of internal consistency proved satisfactory on different samples. In the student sample, the coefficient of internal consistency was $\alpha = 0.82$, the adult $\alpha = 0.87$, while in the clinical sample it was $\alpha = 0.83$. For the purpose of checking the stability of the factor structure, factor analysis was also conducted as part of this research. The correlation matrix proved to be satisfactory and was first implemented with the highest likelihood method using the Kaiser-Guttman criterion for factor retention. The analysis showed the presence of three factors, and the Scree plot test strongly suggested the retention of one factor. Re-conducted analysis with a predetermined one-factor solution indicated that there was one factor that explained 38.32% of the total variance with an average factor saturation of 0.602. The Cronbach α internal consistency coefficient is consistent with previous studies and is $\alpha = 0.895$.

Procedure

The survey was fully conducted online. First, a single instrument was constructed, containing an informed consent instruction

and the measurement instruments described above. The instruction, which was at the very beginning of the digital instrumentation, provided basic information on the topic and purpose of the research, the obligations and rights of the participants (anonymity, voluntary participation and withdrawal from the research at any time without giving any explanation) and information about the contact of the authors, who could be contacted in the case of comments or questions regarding the research or its implementation. It is emphasized that they are supposed to carefully read the instructions of each section of the instrumentation, answering the questions asked honestly, and bearing in mind that there are no correct and incorrect answers.

The instrumentation was uploaded to the social network Facebook, in particular in several student groups, for example “Stjepan Radic - Sava Student dormitory”, where students were asked to respond to the research and to distribute the digital instrument to their friends and fellow students. The instrumentation was available for completion between April 24, 2017 and May 11, 2017.

Results

For the purpose of processing the obtained data, the statistical program IBM SPSS Statistics 23.0 was used.

Table 1. shows descriptive data. In terms of the theoretical range of results of the vari-

Table 1. Descriptive data of the variables used in the research (N =307)

	M	SD	Span		Index of		K-S ^a	α^b
			theoretically	achieved	symmetry	flattening		
Health Promotion Behaviours	2.63	0.14	1 – 4	2 – 4	-0.262	-0.450	0.027**	0.900
Health responsibility	2.00	0.37	1 – 4	1 – 4	0.307	-0.703	0.000**	0.771
Physical activity and nutrition	2.26	0.40	1 – 4	1 – 4	0.238	-0.767	0.000**	0.859
Nutrition	2.39	0.48	1 – 4	2 – 4	0.068	-0.337	0.000**	0.548
Spiritual growth	2.96	0.30	1 – 4	1 – 4	-0.512	-0.115	0.000**	0.865
Interpersonal relations	3.35	0.23	1 – 4	2 – 4	-0.800	0.037	0.000**	0.845
Stress management	2.56	0.40	1 – 4	1 – 4	-0.153	-0.546	0.000**	0.706
Perceived stress	20.98	7.32	0 – 40	4 – 40	-0.086	-0.556	0.026*	0.876
Problem-oriented coping	20.07	5.88	0 – 44	8 – 44	-0.349	0.284	0.000*	0.723
Emotion-oriented coping	15.97	5.57	0 – 24	0 – 24	-0.515	-0.373	0.000**	0.891
Avoidance	11.61	5.72	0 – 36	0 – 28	0.341	-0.196	0.008**	0.676
Mindfulness	3.72	0.87	1 – 6	1 – 6	-0.254	-0.153	0.017*	0.895

Note: ** $p < 0.01$, * $p < 0.05$; ^a Kolmogorov-Smirnov distribution normality test; ^b Cronbach α Internal Reliability Test

ables used, participants expressed, on average, a moderate level of Health Promotion Behavior ($M = 2.63$; $SD = 0.14$), with the variables Health Responsibility ($M = 2.00$; $SD = 0.37$), Physical activity and nutrition ($M = 2.26$; $SD = 0.40$), Nutrition ($M = 2.39$; $SD = 0.48$), and Stress management ($M = 2.56$; $SD = 0.40$) also at moderate levels, while the variables Spiritual Growth ($M = 2.96$; $SD = 0.30$) and Interpersonal Relations ($M = 3.35$; $SD = 0.23$) are high. Participants also expressed, on average, moderate levels of Perceived stress ($M = 20.98$; $SD = 7.32$) and Problem-oriented coping ($M = 20.07$; $SD = 5.88$), a high level of Emotion-oriented copying ($M = 15.97$; $SD = 5.57$), and low Avoidance ($M = 11.62$; $SD = 5.72$). Finally, we see that participants expressed, on average, a high level of Mindfulness ($M = 3.72$; $SD = 0.87$).

As part of the descriptive data processing, the Kolmogorov-Smirnov test was conducted to check the normality of the distribution of variables used in the study. As seen in Table 1, the normality of distribution of

all variables statistically significantly deviates from the normal distribution. However, further verification of the distributions of the variables by the indices of symmetry and flatness revealed that the distributions of the variables ranged from -2 to 2 [54], and it was therefore concluded that no significant asymmetry of the distribution existed and therefore the implementation of the predicted parametric statistical procedures is possible.

The first research problem was to examine the association of Health Promotion Behaviors with Perceived Stress, Coping Styles and Mindfulness. For this purpose, the Pearson correlation coefficients of the variables, listed in the Table 2., were calculated.

Pearson's correlation coefficients show that Perceived Stress, Problem-oriented copying, Emotion-oriented coping and Mindfulness are significantly correlated with the Promotional Health Promotion Behavior. A low negative association was found between the Perceived Stress and Health Promotion Behavior ($r = -0.386$; $p < 0.01$). Further-

Table 2. Correlation of Health Promotion Behaviors, Perceived Stress, Styles of Coping with Stress (Problem-oriented, Emotion-oriented and Avoidance) and Mindfulness (N = 307)

	1.	2.	3.	4.	5.	6.
1. Health Promotion Behaviors	–					
2. Perceived Stress	-0.386**	–				
3. Problem-oriented copying	0.501**	-0.313**	–			
4. Emotion-oriented copying	0.339**	0.070	0.248**	–		
5. Avoidance	-0.056	0.363**	-0.032	0.138*	–	
6. Mindfulness	0.240**	-0.475**	0.051	0.018	-0.382**	–

Note: ** $p < 0.01$, * $p < 0.05$

Table 3. Intercorrelations of Gender, Age, Health Promotion Behaviors, Perceived Stress, Coping Styles (Problem-oriented, Emotion-oriented and Avoidance) and Mindfulness

	1.	2.	3.	4.	5.	6.	7.	8.
1. Health Promotion Behaviours	–							
2. Gender	-0.067	–						
3. Age	-0.011	0.036	–					
4. Perceived Stress	-0.386**	0.250**	0.130*	–				
5. Problem-oriented style	0.501**	-0.074	0.087	-0.313**	–			
6. Emotion-oriented style	0.339**	0.231**	0.041	0.070	0.248**	–		
7. Avoidance	-0.056	0.117*	0.023	0.363**	-0.032	0.138*	–	
8. Mindfulness	0.240**	-0.103	-0.041	-0.475**	0.051	0.018	-0.382**	–

Note: ** $p < 0.01$, * $p < 0.05$

more, a moderately positive association was found between Problem-oriented copying and Health Promotion Behavior ($r = 0.501$; $p < 0.01$). A significant low positive association was found between Emotion-oriented copying and Health Promotion Behaviors ($r = 0.339$; $p < 0.01$) but also Mindfulness and Health Promotion Behaviors ($r = 0.240$; $p < 0.01$). The only variable who had no significant association with Health Promotion Behavior was Avoidance ($p > 0.05$).

A hierarchical regression analysis was conducted to address the second research problem related to examining the predictive contribution of Perceived Stress, Coping Styles (Problem-oriented style, Emotion-oriented style and Avoidance) and Mindfulness in explaining engagement in Health Promotion Behaviors.

Pearson's correlation coefficients between criteria and predictors were calculated, more

specifically, the possible connections of Health Promotion Behaviors with Perceived Stress, different styles of coping with stress, Mindfulness, and gender and age. Certain associations between criteria and predictors have already been shown in previous work, finding a statistically significant positive association between involvement in Health Promotion Behaviors, Problem-oriented style and Emotion-oriented style and Mindfulness, while associations between engaging in Health Promotion Behaviors and Perceived stress was statistically significant and negative. There was no significant association between involvement in Health Promotion Behaviors and Avoidance. Table 3. also verified the association of Health Promotion Behaviors with the control variables of gender and age but showed that these control variables were not statistically significantly related to the criterion variable of Health Promotion

Behaviors ($p > 0.05$). By calculating Pearson's correlation coefficients, a statistically significant correlation between some predictor variables was obtained. These significant correlation coefficients are mostly low to moderate, and no significant correlation exceeds the value of 0.7, so we can say that there are no unwanted multicollinearity among the predictor variables [55].

To determine the possibility of predicting the involvement in Health Promotion Behav-

iors based on Perceived Stress, stress coping styles and Mindfulness, with gender and age control, a hierarchical regression analysis was conducted in four blocks. The first block of variables in the hierarchical regression analysis consisted of control variables of gender and age, whose contribution to the prediction of involvement in Health Promotion Behaviors was not statistically significant ($p > 0.05$). As shown in Table 4, Perceived stress variable was introduced in the next

Table 4. Hierarchical regression analysis of the contributions of Perceived Stress, Coping Styles, and Mindfulness in predicting Health Promotion Behaviors

Criterion	Predictors	β	R^2	ΔR^2	F	df
Health Promotion Behaviors	First block: control variables					
	Gender ^a	-0.067	0.005	-0.002	0.695	2.304
	Age	-0.008				
	Second block: Perceived Stress					
	Gender ^a	0.031	0.152**	0.143**	18.035**	3.303
	Age	0.040				
	Perceived Stress	-0.399**				
	Third block: Copying Styles					
	Gender ^a	-0.034	0.381**	0.369**	30.775**	6.300
	Age	-0.012				
	Perceived Stress	-0.301**				
	Problem-oriented style	0.337**				
	Emotion-oriented style	0.280**				
	Avoidance	0.030				
	Fourth block: Mindfulness					
	Gender ^a	-0.034	0.391*	0.376*	27.374**	7.299
	Age	-0.015				
Perceived Stress	-0.250**					
Problem-oriented style	0.352**					
Emotion-oriented style	0.267**					
Avoidance	0.058					
Mindfulness	0.117*					

Note: ^a gender code 1= male, 2= female; ** $p < 0.01$, * $p < 0.05$

block and the results showed a statistically significant negative predictive contribution of Perceived stress of 15.2% ($\beta = -0.399$; $p < 0.01$). Block 3 introduced the variables of Styles of coping with stress (Problem-oriented copying, Emotion-oriented copying and Avoidance) and significantly increased the overall explained variance of involvement in Health Promotion Behaviors by an additional 36.9%. Problem-oriented coping ($\beta = 0.337$; $p < 0.01$) and Emotion-oriented coping ($\beta = 0.280$; $p < 0.01$) proved to be significant positive predictors from the mentioned block of variables, whereas Avoidance did not prove to be a significant predictor. The previously included variable Perceived Stress also proved to be a statistically significant negative predictor in this block, however, by including the variables Styles of coping with stress, his contribution to explaining involvement in Health Promotion Behaviors decreased ($\beta = -0.301$; $p < 0.01$). In the last, fourth block, the variable Mindfulness was included, increasing the explanation for total variance statistically significantly to 39.1% and Mindfulness turned out to be a positive predictor ($\beta = 0.117$; $p < 0.05$). The previously included variables Perceived stress ($\beta = -0.250$; $p < 0.01$), Problem-oriented coping ($\beta = 0.352$; $p < 0.01$), and Emotion-oriented copying ($\beta = 0.267$; $p < 0.01$) were also statistically significant predictors, with the largest contribution to the overall explanation of the criteria being attributable to the Problem-oriented copying ($\beta = 0.352$). In addition to the control variables of gender and age, the Avoidance variable also did not prove to be a significant predictor ($p > 0.05$). As we can see in Table 4, the general results of the hierarchical regression analysis show that 39.1% of the total criterion variance can be explained by the selected set of predictors and control variables ($R^2 = 0.391$; $p < 0.01$). In other

words, 39.1% of the common variance in engaging in Health Promotion Behaviors can be explained through Perceived Stress, stress coping styles, and Mindfulness.

Discussion

In the present study, Perceived Stress was found to be significantly negatively associated with Health Promotion Behaviors. In view of this, people who exhibit high levels of Perceived Stress can be assumed to be less involved in Promotional Health Promotion Behaviors, but it is possible the vice versa relation too. A positive correlation was also found between the variables Emotion-oriented style of copying with stress and Health Promotion Behaviors, so it can be assumed that people who frequently know how to use emotion regulation to reduce stress will also be more frequently involved in Health Promotion Behaviors. Contrary to what was assumed, no significant negative association was found with Avoidance and Health Promotion Behaviors.

Furthermore, both aspects of the second hypothesis proved to be correct. The results indicate that individuals who tend to use certain cognitive and behavioral efforts to deal with stressful situations also tend to engage in Health Promotion Behaviors more often. In addition, the findings indicate increased involvement in Health Promotion Behaviors in individuals who exhibit a high level of Mindfulness.

As the results have shown, statistically significant contribution of Perceived Stress, the Problem-oriented style and Emotion-oriented style and Mindfulness in explaining engagement in Health Promotion Behaviors was identified. In line with the hypothesis and research findings, [12,13,14] that link high levels of stress with engaging in harmful health behaviors [19], this study found a statistically

significant contribution of Perceived Stress in explaining involvement in Health Promotion Behaviors. In relation to the other variables, the contribution of Perceived Stress was mediocre, namely, only one variable had a smaller contribution than it had. Therefore, individuals who are highly stressed are more likely to engage in harmful behaviors and less in Health Promotion Behaviors. Unlike different researches that link stress and coping with stress with the potential effects on psychophysiological mechanisms, the mechanism of action of stress and coping with stress on health behaviors is yet poorly understood [56].

People can respond to stress in several ways, physiologically, psychologically, and behaviorally. A behavioral response involves behavior changes, manifested such as the previously mentioned difficulty sleeping, excessive consumption of alcohol, increase appetite etc. [57]. Several studies [15,58] state that hormones that activate stress reactions also play a role in regulating appetite and seeking pleasure, and these can also influence health behaviors such as cigarette smoking and alcohol consumption. According to Friedman [59], stress hormones and cholesterol are closely linked to glucose levels and other metabolic elements that affect and are influenced by what, when and how much a person eats and drinks, as well as how active they are. It also states that nicotine and other similar substances can have dramatic effects on a person's health behaviors. Researchers have also tried to explain the relationship between stress and health behaviors through factors such as social support, degree of self-control, differences in the locus of control of a person, or self-efficacy. According to a study by Steptoe and associates [56], lack of social support is associated with the frequency of engaging in harmful health behaviors like cigarette smoking and alcohol consumption,

whereas no correlation with the existence of social support has been found for health behaviors like increased physical activity. Furthermore, Oaten and Cheng [60] found an association between academic stress and a decrease in student self-control, with increased involvement in harmful behaviors and reduced involvement in promotional health behaviors. Some research [61] has supported the link between the external locus of control and stress, as well as the negative effects of stress on one's self-control and health behaviors. In addition, students with high levels of self-efficacy have been shown to be less likely to drink excessively and more likely to engage in promotional health behaviors [62].

Contrary to our hypothesis, Emotion-oriented coping proved to be a positive predictor, whereas, consistent with our hypothesis, Problem-oriented coping made also a positive predictive contribution in explaining involvement in Health Promotion Behaviors. Therefore, Problem-oriented copying and Emotion-oriented copying predict involvement in Health Promotion Behaviors. In the study of coping with stress and health, fewer studies focus on health behaviors [28]. Although the effectiveness of a coping style, according to Lazarus,[63] depends on the characteristics of the individual, the specific type of situation and the modality being studied, research has shown differences in effectiveness when it comes to health behavior outcomes.

Since some research has shown that Problem-oriented coping contributes to good health and promotional health behaviors (such as physical activity) [29,30], and that it is generally considered as an adaptive way of coping with stress [64], in this research its contribution in explaining the involvement in Health Promotion Behaviors has been questioned, with expectation that it will be significant and positive. The results of this study

confirmed the findings of the previous ones. The high contribution of the Problem-oriented copying in explaining involvement in Health Promotional Behaviors can be explained by the level of estimated controllability of the situation. Specifically, research shows that people use this type of coping more often when they are judging that they can control the situation [23]. At the time of data collection, the participants in this study encountered situations that they perceived, on average, to be moderately stressful. Although the contexts of the situations that participants thought about while filling the Perceived Stress Scale are unknown, when looking at the content of items, it can be noticed that the possibility of controlling the situation is mentioned in several of them (e.g. “You can control the inconvenience in your life.” Or “Feel you have complete event control.”). Given this, it can be assumed that, in this case, the research participants considered the situations they thought about to be largely controllable. In the context of health behaviors, a stressful situation that the participant feels that he can be controlling her, is also more likely to be associated with engaging in Health Promotion Behaviors.

Contrary to our assumptions, Emotion-oriented style of copying is a positive predictor of involvement in Health Promotion Behaviors. Researchers such as Kohn (1996, according to Austenfeld and Stanton) [65] often associate this style of coping with various maladaptive outcomes in the literature, while ignoring the claims of other researchers [25] according to which both, Problem-oriented and Emotion-oriented coping, have adaptive potential. We have made similar allegations in this study, and did not expect the results obtained. A potential explanation can be found in items that measure the level of

use of Emotion-oriented coping style. Specifically, the items that describe this type of coping mostly involve positive behaviors that tend to get emotional support, validation of feelings, or advice (e.g. “Talking to someone about my feelings.” or “Trying to get emotional support from friends and relatives.”). Items, described in this way could potentially be associated with a sense of social support, that could be used by the person as an additional support when engaging in Health Promotion Behaviors in stress situations.

Also contrary to our assumptions, Avoidance has not proven to be a significant predictor in explaining involvement in Health Promotion Behaviors. The result could be explained by the fact that the participants in this study expressed below average level of using Avoiding as a way of coping with stress. Likewise, the result obtained can be explained by the absence of a statistically significant association with the criterion variable. Penley, Tomaka, and Wiebe [29], in their meta-analysis of the association of coping styles with different health outcomes and behaviors, also found similar results according Avoidance. Authors [29] have attributed this finding to the various stressful situations that individuals refer to when evaluating the use of some way of coping with stress. Although the Avoidance variable did not appear to be significant in explaining inclusion in Health Promotion Behaviors, the other coping styles individually, as well as the block of Stress Coping variables alone, significantly contributed to explaining inclusion in Health Promotion Behaviors.

Mindfulness thus proved significant in predicting increased involvement in Health Promotion Behaviors. As mentioned earlier, reduced levels of Mindfulness are significantly associated with behaviors such as overeat-

ing, and phenomena such as poor sleep quality and increased levels of stress [38], which in the long term can have adverse health effects overall. These and similar findings demonstrate the value of Mindfulness in reducing stress and indirectly reducing the incidence of health problems as well as adverse health behaviors that are also associated with stress [38]. The contribution of Mindfulness in explaining involvement in Health Promotion Behaviors can be explained partly by the focus on the present and current events that are important in freeing people from automatic thoughts, habits and unhealthy behaviors and in accelerating behavior self-regulation [34]. The results obtained could serve as a kind of argument in emphasizing the importance of empowering skills that would help increase the level of Focused Awareness. Brown, Ryan, and Creswell [66] state that the specific receptive-observational way, in which a person processes external and internal information within Focused Awareness/Mindfulness, facilitates regulation of decision-making already pre-partially colored by existing needs, values, feelings, and adaptation to existing capabilities and requests. In other words, the greater awareness provided by Mindfulness facilitates the provision of more flexible and adaptable reactions to events, and at the same time helps to minimize automatic, common or impulsive reactions [32,67].

Gender and age variables did not appear to be significant predictors in explaining involvement in Health Promotion Behaviors, which may be explained by the absence of a statistically significant association among these variables. Certain studies, such as Von Bothmer's and Fridlund's [62], have cited gender variables as essential in distinguishing involvement in certain health behaviors. As

far as age was concerned, there were no studies that examined age in relation to involvement in health behaviors, but we thought it would be interesting to check the relationship. However, like gender, it proved to be an insignificant predictor.

Conclusion

Research findings indicate a significant correlation between Perceived Stress, Problem-oriented and Emotion-oriented style of coping with stress, and Mindfulness, in student involvement in Health Promotion Behaviors. Perceived stress, Problem-oriented and Emotion-oriented styles of coping and Mindfulness have a significant contribution in predicting taking part in Health Promotion Behaviors. Specifically, lower levels of stress, higher level of Problem and Emotion-oriented styles of coping and higher level of Mindfulness predict a higher level of taking part in Health Promotion Behaviors by college students. The results of this study may be useful for constructing educational programs and interventions for both students and the general population, with the aim on spreading the knowledge of the many potential benefits of partaking in promotional health behaviors as well as helping individuals in changing their potentially harmful behaviors or in sustaining their protective health behaviors and with particular emphasis on developing and empowering coping styles to promote health and improve overall health and quality of life.

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Conflicts of interest

None to declare.

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Percipirani stres, suočavanje sa stresom i usredotočena svjesnost su prediktori promotivnih zdravstvenih ponašanja studenata

Sažetak - Cilj istraživanja bio je ispitati prediktivni doprinos percipiranog stresa, suočavanja sa stresom i usredotočene svjesnosti u objašnjavanju uključivanja u promotivna zdravstvena ponašanja, uz kontrolu doprinosa varijabli spola i dobi. Istraživanje je obuhvaćalo 307 studenata (269 ženskih i 38 muških sudionika) sa 45 visokih učilišta s područja Republike Hrvatske. Učestalost uključivanja u promotivna zdravstvena ponašanja mjerena je Upitnikom promotivnih zdravstvenih ponašanja-II – HPLP-II, za mjerenje razine percipiranog stresa korištena je skraćena verzija Ljestvice percipiranog stresa – PSS10, skraćeni Upitnik suočavanja sa stresom – BriefCOPE korišten je za mjerenje stilova suočavanja sa stresom, dok je za mjerenje konstrukta usredotočene svjesnosti korišten Upitnik usredotočene svjesnosti – MAAS. Povezanost među varijablama mjerena Pearsonovim koeficijentom korelacije pokazala je da postoji značajna povezanost percipiranog stresa, Problemu usredotočenog i Emocijama usredotočenog suočavanja i usredotočene svjesnosti s promotivnim zdravstvenim ponašanjima. Rezultati hijerarhijske regresijske analize su pokazali da percipirani stres, Problemu usredotočeno i Emocijama usredotočeno suočavanje i usredotočena svjesnost pokazuju značajni doprinos u predviđanju uključivanja u promotivna zdravstvena ponašanja. Konkretno, rezultati su pokazali da niža ra-

zina percipiranog stresa, viša razina Problemu usredotočenog i Emocijama usredotočenog suočavanja te viša razina usredotočene svjesnosti predviđaju veću uključenost studenata u promotivna zdravstvena ponašanja. Dobiveni rezultati mogu se koristiti u izradi edukacijskih programa i intervencija, čiji bi cilj bio proširiti saznanja o brojnim potencijalnim koristima uključivanja u promotivna zdravstvena ponašanja te pomoći i studentima i općoj populaciji u promjeni štetnih ili održavanju zaštitničkih zdravstvenih ponašanja.

Ključne riječi: promotivno zdravstveno ponašanje, percipirani stres, suočavanje sa stresom, usredotočena svjesnost

