

# **Validation of The Primary Emotional Appraisal Scale in the sample of university students**

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### **3. Validation of The Primary Emotional Appraisal Scale in the sample of university students**

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#### **Abstract**

Stress is one of the crucial factors affecting well-being in different aspects of people's lives (The American Institute of Stress 2014). It can be perceived as a negative state that is a threat for health (distress) or an constructive and motivating reaction to a challenge which an organism has to face (eustress; Selye 1975). In this context, it seems to be highly relevant to create valid and reliable tools that could be used to assess differences in the perception of a stressful situation. The aim of this study was to validate The Primary Emotional Appraisal Scale in educational context. The scale is intended for evaluation of fifteen emotions related to primary emotional appraisal of a situation. Emotions are grouped into four categories: threat, harm, challenge, and benefit. Validation was conducted on 363 students of University of Gdansk, 300 women and 62 men. The mean age of the sample was  $M = 21.52$  ( $SD = 3.94$ ). Firstly, in the neutral situation participants were asked about current stress level. Then in a situation of test they were again asked about the stress they experience and filled in Primary Emotional Appraisal Scale. Additionally, the stress during typical exam was measured. Different factorial models were tested with Confirmatory Factor Analysis (CFA). Reduced three factor model of threat, harm and challenge/benefit had the best fit to the data. Results showed that stress in a test situation is positively related to threat appraisal and negatively related to harm appraisal, while the level of general examination stress is positively related to threat appraisal. Every form of appraisal was found to be related to the reactivity to stress in the test situation. More studies are required to investigate the ability of the Primary Emotional Appraisal Scale to distinguish between eustress and distress. Meanwhile, results indicate differences in emotional appraisal of particular stressful situations.

#### **1. Introduction**

Stress is one of the most important variables in the study of the overall mental well-being. According to The American Institute of Stress (2014), 77% of people regularly experience physical symptoms of stress and 73% of people experience psychological symptoms caused by stress. What is more, chronic stress and ineffective coping strategies are well established risk factors for many illnesses, such as cardiovascular disease (Dimsdale 2008), hypertension (Liu et al. 2017), diabetes (Kelly & Ismail 2015), many types of cancer (Chida et al. 2008), insomnia (Morin et al. 2003), neurodegenerative disorders and psychological disorders, such as depression and anxiety (Plana et al. 2014). Taking this into account, it is essential to explain which factors cause stress, and how does it affect the human body and cognition. What is more, differentiation between positive mobilizing stress and distress is warranted (Henderson et al. 2012). Valid and reliable measures for examining the appraisal of stressful situations are necessary. The aim of this paper was to examine one such measure in the educational context. While, for many engaged students exams and tests may be challenges which stimulate them to learning, for numerous others they pose serious problems due to exaggerated fear of being evaluated (Atroszko, 2015; Atroszko et al. 2015; Wróbel et al. 2016). For this reason, systematic research into the processes of students' appraisal of test situations and factors related to it seems crucial.

The term *stress* was used for the first time to describe physical and psychological response to disadvantageous conditions or influences (Selye 1964). Subsequently, stress was differentiated into eustress and distress. Eustress is defined as a state that is agreeable and healthy for the organism,

while distress is disagreeable and pathogenic (Selye 1975). Eustress is related to the positive psychological states, such as hope, meaningfulness and willingness to achieve goals (Simmons & Nelson 2001). Distress, also known as a strain, is associated with a variety of health risks and problems (Quick et al. 2003; Weidner et al. 1997). The higher level of distress can negatively impact performance on complex tasks, especially if they require decision making, working memory, and divided attention (LeBlanc & Vicki 2009). On the other hand, reappraising arousal that originally results from stressful tasks as a functional and adaptive has positive cognitive and physiological implications (Jamieson et al. 2012).

Lazarus and Folkman (1987) argue that stress should be considered as a result of the cognitive appraisal of the situation. They distinguish two types of appraisal: primary and secondary, which have different functions and deal with different sources of information. Primary appraisal has a motivational function and concerns evaluating whether something is important to our well-being or not. There are four types of primary appraisal: *harm*, when something negative already has been experienced, *threat*, that is anticipated harm, *challenge*, which is related to a potentially positive outcome but the person needs to mobilize and cope with the obstacles to achieve it, and the fourth is *benefit*, when the gain and other positive outcomes are very likely to achieve and are personally important to the person. The Primary Emotional Appraisal Scale measures fifteen emotions, grouped in four categories: threat, harm, challenge and benefit. The scale is based on the *Transactional Model of Stress and Coping* (Lazarus & Folkman 1984) and measures primary emotional appraisal of the situation. The original version has demonstrated adequate validity and reliability (Folkman & Lazarus 1985).

It has been shown that examination stress has a negative impact on immunological functions (Segerstrom & Miller 2004; Marketon & Glaser 2008). Another studies show that students who experience higher psychological distress before the exam, tend to have higher salivary cortisol and significantly lower exam performance (Ng et al. 2003), which is congruent with the effect of test anxiety (Cassady & Johnson 2002). Perceiving the situation of the exam as a challenge or benefit might cause eustress, instead of unpleasant distress, and have a positive influence on academic results. Some suggest that the situation might be perceived as eustress when causes mild or moderate stress (Bhat et al. 2012), and that it has beneficial outcomes for students' well-being (Sarid et al. 2004). However, stressful experience can be simultaneously recognized as a distress and eustress (Gibbons et al. 2007).

Sometimes stress is considered a physiological reaction, while distress and eustress are understood as reactions to stress (Nelson & Simmons 2004). Distress is conceptualized in many ways, while eustress is often understood as a lack of distress (Czun-Tung et al. 2016). In studies respondents may have difficulties with distinguishing eustress from distress because they are used to the negative perception of stress (Gibbons et al. 2007). Further, when investigating subjective declarative levels of experienced stress it is important to take into account that many individuals, especially those employing ineffective stress coping mechanisms such as denial of problems, often underestimate their levels of stress measured by objective physiological reactions (Buntrock, Reddy 1992). They also tend to overestimate their level of competence in stressful situations. For this reasons it can be expected that subjective measures of general stress will not show consistent relationship with particular appraisal components.

On the basis of previous research and theoretical frameworks it is hypothesized that: The Primary Emotional Appraisal Scale has four factors (H1); the relationship between threat or harm appraisal and the general examination stress is positive, and there is no relationship between challenge or benefit appraisal and the general examination stress (H2a); the relationship between threat or harm appraisal and the stress before the test is positive, and there is no relationship between challenge or benefit appraisal and the stress before the test (H2b); the relationship between threat or harm appraisal and the reactivity to stress in the situation of test is positive, and there is no relationship between challenge or benefit appraisal and the reactivity to stress in the situation of test (H2c).

## 2. Methods

*Participants.* Three hundred sixty two students took part in this study: 300 women (82.9%), 62 men (17.1%). The mean age of the sample was  $M = 21.52$  ( $SD = 3.94$ ). Confirmatory factor analyses were performed on the whole sample. Regression analyses were performed on 272 students, with mean age of  $M = 20.97$  ( $SD = 1.85$ ). Participants were from University of Gdańsk, from different faculties, years and modes of study.

*Measures.* Primary Emotional Appraisal Scale was used (Lazarus & Folkman 1987). This method is based on Lazarus and Folkman's research and theory (1984). The scale is intended for evaluation of fifteen emotions, grouped in four categories: (1) Threat: worried, anxious, fearful, (2) Harm: angry, sad, disappointed, guilty, disgusted, (3) Challenge: confident, eager, hopeful, (4) Benefit: exhilarated, pleased, happy, relieved. Participants were asked about their emotions in the current situation and provided answers on a five-point Likert scale from (1) *I don't feel emotion* to (5) *high level of emotion*. The factorial structure of the scale has not been investigated before.

Perceived stress during standard examination situation was measured by single-item measure (Atroszko, 2014), which includes the question: "What is your average stress level during an exam?" The answers were provided on a seven-point format response scale from (1) *I am not stressed at all* to (7) *I am very stressed*. Previous studies demonstrated good validity of the scale (Atroszko 2015), as well as the test-retest reliability (Atroszko, 2014).

The stress experienced in a current situation (neutral and test situation) was measured by single-item measure. Participants were asked: "What is your current stress level?" Response scale ranged from (1) *I am not stressed at all* to (10) *I am very stressed*. The measure showed good validity and reliability measured as test-retest with one month interval before academic tests within the same academic classes. Intraclass correlation coefficient (ICC) was .84 (Atroszko 2015).

*Procedure.* Data collection used convenience sampling. Students were invited to participate anonymously in the study during lectures or classes, more than 99% agreed to do so. Participants reported their level of stress in two circumstances: neutral and test situation. Moreover, before the test students completed The Primary Emotional Appraisal Scale. Furthermore, they were asked about their average examination stress level. No monetary or other material rewards were offered.

*Factor analysis.* Four factor structure was tested, in which all factors (threat, harm, challenge, benefit) were correlated. CFA of the Polish version of the scale showed overlap of challenge and benefit dimensions which resulted in combining them into one factor. Moreover, items measuring relief and hope were eliminated because of the low factor loadings. Analysis of modification indices was performed. Item related to confidence had positive loading on challenge/benefit dimension and negative loading on threat dimension. Final model assumed three correlated factors with no correlation of error terms. Following measures were used to evaluate fit of the model:  $\chi^2$  divided by degrees of freedom ( $\chi^2/df$ ), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Squared Error of Approximation (RMSEA). Cut-off scores for those indexes for acceptable fit are:  $\chi^2/df \leq 3$ ,  $CFI \geq 0.95$ ,  $TLI \geq 0.95$ ,  $RMSEA \leq 0.06$  to  $0.08$  with confidence interval (Hu & Bentler 1999; Schreiber et al. 2006). Maximum likelihood estimator was used. IBM SPSS AMOS 24 was used to perform factor analyses.

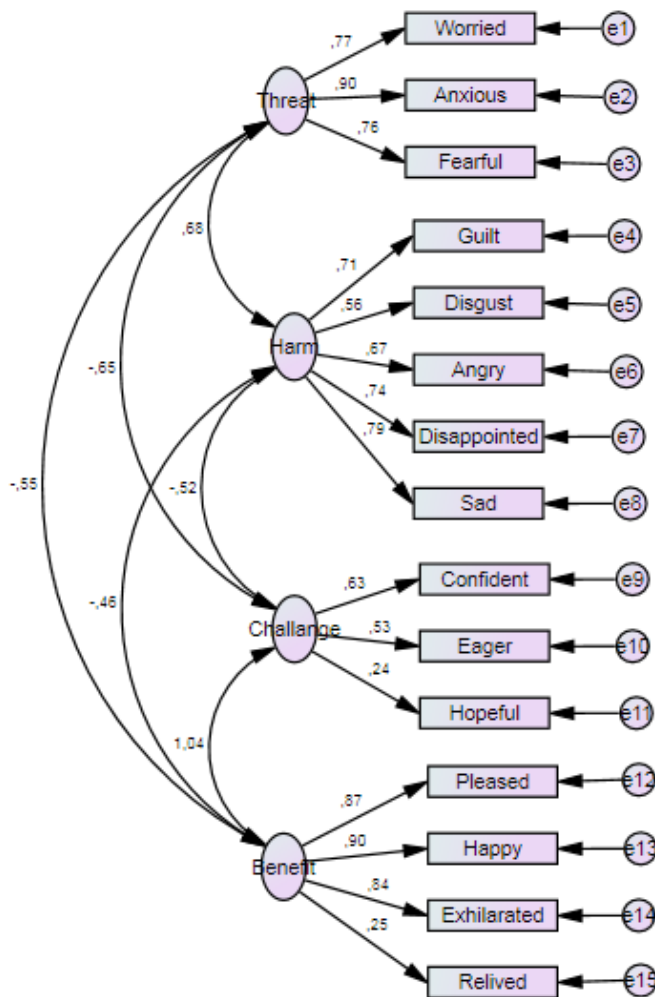
*Statistical analysis.* Difference between declared stress in test and neutral situation was calculated, assuming that it shows increase in stress due to the test. Means, standard deviations, percentages and Pearson correlation coefficients between all measures of stress and three appraisal components were calculated. The Spearman correlation coefficients between measures of stress and particular emotions were calculated. Three hierarchical regression analyses were conducted. The dependent variables in each model were different measures of stress. The first model included general level of examination stress, the second one included current stress level during test. Finally, third model included reactivity to stress in the situation of test. Independent variables were the same in all models. In the first step, sex and age were added. Independent variables added in the second step were threat, harm and challenge/benefit calculated as factorial scores with Bartlett method (DiStefano, Zhu, Mîndrilă, 2009). For all linear regression analyses, preliminary analyses were conducted to ensure no

violation of the assumptions of normality, linearity and multicollinearity. Standardized regression coefficients were reported. All statistical analyses were conducted in IBM SPSS 24.

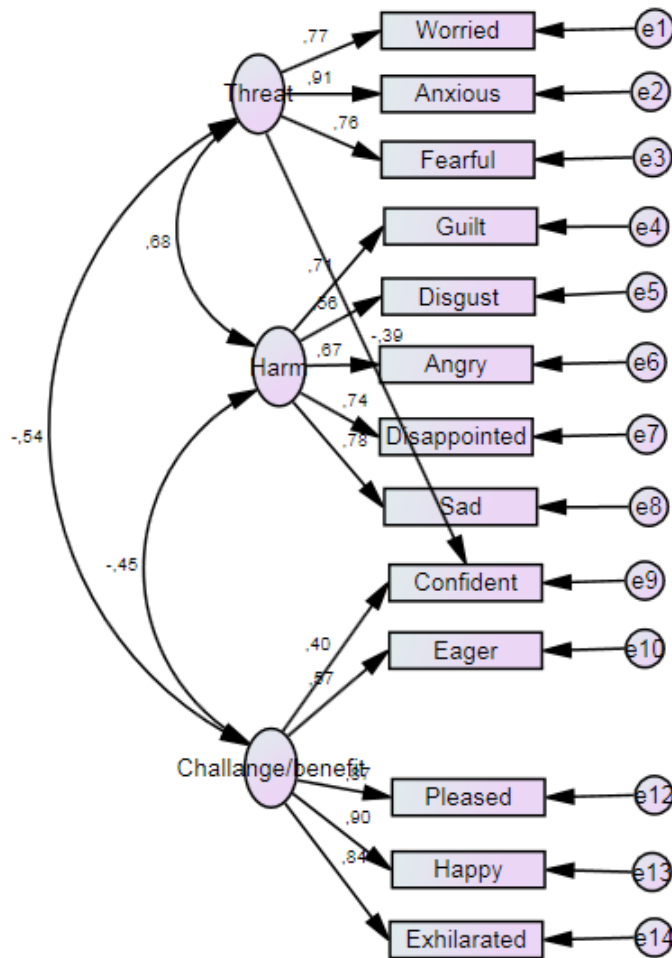
### 3. Results

*Factor analyses.* Original model with four factors of primary emotional appraisal showed following fit:  $\chi^2(84) = 383.63$  ( $p < .001$ ),  $\chi^2/df = 4.57$ , CFI = .89, TLI = .858, RMSEA = .099 (90% CI = .089 – .110). Standardized factor loadings on items and correlations between factors are shown on the Fig. 1. Due to the lack of acceptable fit, a modified model with three factors, two items eliminated and one item correlated with two factors was tested. This model of primary emotional appraisal showed following fit indices:  $\chi^2(61) = 189.42$  ( $p < .001$ ),  $\chi^2/df = 3.11$ , CFI = .948, TLI = .934, RMSEA = .076 (90% CI = .064 – .089). Standardized factor loadings on items and correlations between factors are shown on the Fig. 2. This model showed acceptable fit to the data.

*Reliability.* For the present sample the Cronbach's alpha reliability coefficient was .84 for Threat, .77 for Harm, and .86 for Challenge/benefit.



**Fig.1.** The factor structure and the standardized loadings of the items on the original concept of Primary Emotional Appraisal Scale with acceptable fit to data.



**Fig. 2.** The factor structure and the standardized loadings of the items on the Primary Emotional Appraisal Scale with acceptable fit to data.

*Results of statistical analysis.* Tab 1. presents percentages, mean scores and standard deviations for the measures of stress level and appraisal components as well as interrelationships between them. Tab 2. presents percentages, mean scores and standard deviations for the measures of stress level and particular emotions and interrelationships between them.

The first regression analysis for general stress level during examination showed that the independent variables added in step 1 explained 11.6% of variance ( $F_{2,269} = 17.72$   $p < .001$ ). Independent variables added in step 2 explained 7.7% of variance ( $\Delta F_{3,266} = 8.49$   $p < .001$ ). The independent variables explained a total of 19.4% variance of general stress level during exams ( $F_{5,266} = 12.78$ ). Significant independent variables in Step 2 were sex ( $\beta = -.28$ ) and threat ( $\beta = .30$ ) (see Table 3).

In the second model the regression analysis for stress level in current test situation showed that the independent variables added in step 1 explained 1.6% of variance ( $F_{2,246} = 1.96$   $p = .142$ ). Three independent variables added in step 2 explained 32.6% of variance ( $\Delta F_{3,243} = 39.67$   $p < .001$ ). The independent variables explained a total of 33.9% variance of level of stress ( $F_{5,243} = 24.96$   $p < 0.001$ ). Significant independent variables in Step 2 were age ( $\beta = .14$ ), threat ( $\beta = .64$ ) and harm ( $\beta = -.18$ ) (see Table 3).

The regression analysis for reactivity to stress in the situation of test in third model showed that the independent variables added in step 1 explained 0.4% of variance ( $F_{2,209} = .41$   $p = .665$ ). Independent variables added in step 2 explained 15.5% of variance ( $\Delta F_{3,209} = 12.68$   $p < .001$ ). The independent variables explained a total 15.9% of variance of the level of stressing out ( $F_{5,206} = 4.64$ ). Significant independent variables in Step 2 were threat ( $\beta = .39$ ), harm ( $\beta = -.25$ ) and challenge/benefit ( $\beta = -.15$ ) (see Table 3).

**Tab. 1.** Mean scores and standard deviations, percentages, and correlation coefficients between age, sex, measures of stress and appraisal components.

	M (SD)/%	2	3	4	5	6	7	8
1 Sex <sup>a</sup>	20.97 (1.85)	.14*	-.04	.11	.06	-.11	.12	.84
2 Age	11% men		-.16**	.01	.08	-.34**	-.06	-.01
3 Threat	7.60 (3.01)			.54**	-.46**	.32**	.55**	.31**
4 Harm	8.00 (3.42)				-.34**	.08	.19**	.00
5 Challenge/ benefit	13.63 (4.19)					-.17**	-.24**	-.24**
6 General examination stress	4.87 (2.11)						.35**	.16*
7 Stress in test situation	4.44 (2.11)							.65**
8 Reactivity to stress in the situation of test	1.73 (2.32)							

<sup>a</sup> Point-biserial correlation coefficient, 1 = women, 2 = men.

\*  $p < .05$ . \*\*  $p < .01$ .

#### 4. Discussion

Hypothesis 1 was not confirmed. CFA in the sample of Polish students showed that the Primary Emotional Appraisal Scale consists of three factors. These factors include threat, harm and challenge/benefit. The results suggested high degree of overlap between challenge and benefit which lead to merging of these two components. This overlap could have been caused by the fact that positive emotions are likely to be more general and less distinct than negative emotions (Friedricson 1998). Moreover, positive emotions do not have so diversified autonomic response (Cacioppo et al. 1993). The authors of the Transactional Stress Theory, at the beginning distinguished only three main categories in the primary emotional appraisal context (Lazarus & Launier 1978). However, when developing their scale these authors referred to four categories, distinguished in the latest conception (Lazarus & Folkman 1987). This scale, however was not previously tested with CFA. Items related to hope and relief were removed from the scale due to low factor loadings (<.40). Hope may be more of a dispositional trait than situational emotion (Snyder 1995). On the other hand, relief which is linked to ceasing vigilance (Smith & Lazarus 1991), may be strictly specific emotion bound to occur in certain situations, but not as a component of general positive appraisal. The item related to confidence had significant loadings on two factors, threat and challenge, because the appraisal of situation as a threat may result in the distortion of a positive self-image (Abouserie 2006). Hypothesis 2a was partially confirmed. General examination stress was positively related to threat appraisal, however it was not associated to challenge/benefit and harm appraisal. Thus, the results showed that perceiving situation as a threat is related to higher stress. General examination stress was not associated with harm appraisal, and it might be related to the fact that general stress during exams seems to be more distant and abstract than currently experienced situation of being tested. Harm represents emotions that are rather related to outcome of the situation and appear when something negative already has been experienced (Folkman & Lazarus 1985).

**Tab. 2.** Mean scores and standard deviations, percentages, and Spearman correlation coefficients between age, sex and particular emotions.

	M (SD)/%	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Sex <sup>a</sup>	20.97 (1.85)	.18*	-.12*	-.17*	-.13*	-.02	-.01	.06	-.01	.06	.13*	.04	.11	.01	.01
2 Age	11% men	.02	.02	-.04	-.06	.11	.04	.06	.06	.03	.12*	.00	.04	.08	.02
3 Worried	2.54 (1.14)			.67**	.54**	.40**	.50**	.36*	.51**	.20**	-.44**	-.12**	-.35**	-.31**	-.32**
4 Anxious	2.82 (1.16)				.71**	.32**	.50**	.31**	.43**	.12	-.48**	-.17**	-.44**	-.39**	.41**
5 Fearful	2.23 (1.16)					.29**	.38**	.31**	.35**	.19**	-.36**	-.14*	-.28**	-.30**	-.30**
6 Angry	1.58 (.89)						.46**	.47**	.34*	.37**	-.14*	.02	-.19**	-.10	-.11
7 Sad	1.90 (1.14)							.47**	.51**	.27**	-.35**	-.21**	-.39**	-.33**	-.36**
8 Disappointed	1.69 (1.05)								.40**	.28**	-.23**	-.05	-.23**	-.20**	-.17**
9 Guilt	1.57 (.92)									.27**	-.33**	-.01	-.27**	-.26**	-.26**
10 Disgust	1.23 (.67)										-.01	.06	-.06	-.07	-.12
11 Confident	2.96 (.91)											.35**	.54**	.51**	.44**
12 Eager	2.37 (1.05)												.49**	.50**	.52**
13 Exhilarated	2.79 (1.03)													.69**	.73**
14 Pleased	2.81 (1.11)														.76**
15 Happy	2.71(1.11)														

<sup>a</sup> Rank-biserial correlation coefficient, 1 = women, 2 = men.

\*  $p < .05$ . \*\*  $p < .01$ .



**Tab. 3.** Results of hierarchical multiple regression analyses in which age, sex, three categories of primary emotional appraisal were regressed upon the different measures of stress level (standardized regression coefficients are reported).

Step	Predictor	General examination stress		Stress in test situation		Reactivity to stress in the situation of test	
		<i>B</i>	$\Delta R^2$	<i>B</i>	$\Delta R^2$	<i>B</i>	$\Delta R^2$
1	Age	-.06	.11**	.11	.02	-.06	.00
	Sex <sup>a</sup>	-.33**		-.08		.00	
2	Age	-.05	.07**	.14**	.32**	-.03	.16**
	Sex <sup>a</sup>	-.28**		.03		.06	
	Threat	.30**		.64**		.39**	
	Harm	-.08		-.18**		-.25**	
	Challenge/benefit	-.04		-.04		-.15*	
Total <i>R</i> <sup>2</sup>			.19**		.34**		.16**

<sup>a</sup> 1 = women, 2 = men.

\* *p* < .05. \*\* *p* < .01.

In other words, while exam may be generally threatening because there is always a factor of uncontrollable circumstances, it would be harmful if the person already had premises to suspect that in the specific situation it might cause harm (e.g. due to being unprepared).

Similarly, there was no relationship between general examination stress and challenge/benefit appraisal which may also be more dependent on the specific situation rather than general attitude to exams. It could be also due to the fact that, while the mobilization is an essential part of stress reaction, stress during exams might not be interpreted as mobilizing by everyone (Kemeny 2003). These results show that general idea of how exams are stressful for the individual is related to the extent to which he/she perceives specific test situation as threatening, rather than harmful or beneficial/challenging, and this may reflect more general belief of the individual that test situations are threatening rather than harmful or beneficial/challenging per se (which would be more situation specific).

Hypothesis 2b was also partially confirmed. Stress before the test was negatively related to harm and positively related to threat. There was no relationship between stress before the test and challenge/benefit appraisal. It can be explained by the fact that after controlling for threat and challenge/benefit, people that appraised concrete test situation as a harm might be withdrawn, resigned and helpless. Consequently, they could declare less stress – perceived as arousal – before the test. Similarly, when controlling for threat and harm, challenge/benefit appraisal does not explain additional variance in test stress probably because the negative appraisal is primarily associated with stress arousal and this is commonly perceived as experienced stress.

Hypothesis 2c was partially confirmed. Reactivity to stress in the situation of test was positively related to threat and negatively related to challenge/benefit as well as harm. Negative relationship between challenge/benefit and reactivity to stress might appeared because probably most of the participants did not interpret their positive arousal as stress. It is in line with previous research which showed that students who are more stressed demonstrate less challenge/benefit appraisal (Almeida & Mroczek 2004). As it was mentioned at the beginning, it may be explained by the fact that eustress is an underestimated type of stress (Nelson & Simmons 2004). When asked about stressful situations, participants of psychological studies usually conceptualize them as distress. They seldom consider stress as mobilization and potential factor of performance improvement. Thus, perceiving situation as a challenge/benefit might be negatively associated with declarative measures of stress.

In conclusion, The Primary Emotional Appraisal Scale is a valid and reliable declarative measure of stress appraisal. However, similarly to the most of the previous studies there are some difficulties with differentiating eustress from distress based on this appraisal. The scale is more strongly related to stress perceived by respondents as a negative phenomenon. The results show a complex patterns of relationships between different components of appraisal which need to be taken into account whenever stress is investigated. The strength of this paper is fairly large sample, valid and reliable measures and design which included measurements both in neutral and stressful situation.

The limitations of this study include not representative sample, including predominantly females and students of social sciences. Therefore, the results may be generalized to the population with some reservation. Future studies should provide further data on the psychometric properties of Primary Emotional Appraisal Scale, especially in other contexts than educational. Though distress is well examined in many contexts, it seems to be highly warranted to perform research on eustress in educational contexts to extend our understanding of its positive outcomes, especially in terms of the academic satisfaction and students' performance.

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