PRIMENJENA PSIHOLOGIJA, 2018, Vol. *11*(4), STR. 399-417

UDK:159.942.072:177.4:618.25
Originalni naučni rad
doi: 10.19090/pp.2018.4.399-417

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GENETIC AND ENVIRONMENTAL FACTORS IN EMOTION REGULATION AND LIFE SATISFACTION: A TWIN STUDY[2]

An expansion of the mental health research at the end of the 20th century largely places well-being in the focus of interest of contemporary psychological science. However, the state of the art results of behavioral-genetic studies provide a complete framework of the factors that influence the indicators of subjective well-being through the specification of etiology of their relationship. The main aim of this study is to evaluate genetic and environmental factors that contribute to connections among life satisfaction measures and emotional regulation. The study included 182 pairs of twins of both sexes (121 monozygotic and 61 dizygotic twin pairs), aged 18-48. The proportion of individual sources of covariance between the examined phenotypes was tested with a multivariate biometric method. Genetic factors explained a slightly higher variance of life satisfaction (53%), while the environmental factors had a significant role in explaining different types of emotional regulation. General genetic factors were potentially important only in the explanation of the cognitive reappraisal of negative emotions. In other cases, the environmental factors were of the greater importance. An insight into the phenotypic correlations suggests these constructs have low to moderate intercorrelations; likewise genetic factors have a potential significance (45%) merely in the case of two types of cognitive reappraisal of emotions.

Key words: cognitive reappraisal, emotion regulation, emotional suppression, satisfaction with life, twin study

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Primljeno: 03. 12. 2018.
Primljena korekcija: 17. 12. 2018.
Prihvaćeno za štampu: 19. 12. 2018.

[2] This study was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia [Grant ON179006].

Introduction

In the psychology of mental health, contemporary theories of well-being are based on two different approaches. The first approach emphasizes a subjective appraisal and personal experience, uses hedonism as the main determinant of well-being affected by positive and negative emotions, as well as a subjective evaluation of satisfaction with one's own life (Diener et al., 2010). The second approach derives from the eudaimonistic conceptualization of well-being, explaining it throughout the growth and development of human potential through autonomy, relationships with other people, self-acceptance, finding the meaning of life, and personal progress (Ryff, 1989). Researchers often combine these two approaches, and, in many cases, consequently do not use subjective and psychological well-being as exclusive constructs. In this view, current models of subjective well-being largely rely on the idea that the experience of well-being depends on both cognitive and affective components. Considering the results of previous physiological studies, it can be concluded that the affective and cognitive processes are linked, both through a common neurohumoral basis (Ledoux & Phelps, 2008), and the emotional regulation, like perception process, attention and decision-making (Storbeck & Clore, 2007). It seems that studying the well-being concepts at the behavioral-genetic level is of utmost importance for determining the influence of genetic and environmental factors on the development of different cognitive and emotional potentials, such as life satisfaction and emotional regulation.

Satisfaction with Life and Emotion Regulation: Operationalization and Relations

Diener (Diener, 1984) defines the concept of the subjective well-being as tripartite: life satisfaction, a high level of positive affect, and a low level of negative affect. The satisfaction with life is a cognitive component of the subjective well-being, refering to the perception and evaluation of an individual about the quality of one's own life (Diener, Suh, Lucas, & Smith, 1999). Although there are dilemmas about the operationalization of this construct (Diener, Lucas, & Oishi, 2002), most researchers agree with the statement that satisfaction with life as a construct has an evaluation character, through which every individual globally assesses his/her own life. The results of the previous studies indicate that the satisfaction with life is of great importance for mental health, regarding a positive relationship with marriage and partnerships (Powdthavee, 2009), a lower level of stress (Argyle, 1999), general health status (Diener & Chan, 2011), and other indicators of subjective well-being.

The emotional regulation is a key aspect of emotional processes that mediate between different preconditions for reporting emotions and the actual emotional response, also affecting psychological and physiological functioning (Gross & John, 2003). According to Gross (1998), the emotional process has a temporal character, and begins either by some activating external event, or by the mental representation a person evaluates, regardless of whether an activating event in the external environment has actually occurred. Evaluation of the event or the mental representation further triggers a series of behavioral and physiological responses that can be regulated before the real manifestation of an emotion (Gross & Thompson, 2007), through processes that are carried out before a full development of an emotional response, and directed to an activating, emotionally generating situation, but also through the reduction of physiological response, and a reduction of inadequate response modes after developing a complete emotional response (Gross & John, 2003).

According to the model, the authors distinguish two time-distanced and qualitatively different types of the emotional regulation: a cognitive reappraisal and an emotional suppression (Gross & John, 2003). While the cognitive reappraisal is a process of reinterpretation of an activating event that changes the emotional response in an adaptive way, the emotional suppression represents a process of regulating one's own emotional reaction in order to avoid its manifestation (Gross, 1998). When it comes to the emotional suppression, a series of research results point to its dysfunctional nature. For example, the emotional suppression causes an increase of inadequate physiological response and a reduction in memory capacity (Richards & Gross, 2000), as well as a lower quality of interpersonal relationships (Srivastava, Tamir, McGonigal, John, & Gross, 2009). At the same time, the level of the emotional suppression is partly modulated by both cultural factors and / or environmental influences (Kim et al., 2011). The cognitive reappraisal, which is directed to regulation of activating and usually negative situations, most often has positive outcomes of the emotional regulation for a consequence, such as improving the work performance, increasing the enthusiasm (Leroy, Grégoire, Magen, Gross, & Mikolajczak, 2012), healthier functioning of the cardiovascular system (Mauss, Cook, Cheng, & Gross, 2007), reduction of the distress and physiological reactions (Wolgast, Lundh, & Viborg, 2011), as well as the establishment of more functional social relationships (Gross & John, 2003). It is important to note that the cognitive reappraisal refers not only to the reinterpretation of negative emotions, but it can also be a process directed to positive emotions in order to increase their effects (Mauss & McRae, 2016). According to the concepts of Mauss and McRae (Mauss & McRae, 2016), a distinction between the cognitive reappraisal of positive and negative emotions is also based on different levels of activation of their common physiological bases.

Results of numerous studies aiming to explore connections of satisfaction with life with the emotional regulation point to majority of conclusions about thier positive relationships with cognitive reappraisal (Gross & John, 2003; Haga, Kraft, & Corby, 2009; Perrone-McGovern, Simon-Dack, Beduna, Williams, & Esse, 2015; Yiğit, Özpolat, & Kandemir, 2014), and negative relationships with emotional suppression (Gross, Richards, & John, 2006; Haga et al., 2009; Randal, Rickard, & Vella-Brodrick, 2014; Soto, Perez, Kim, Lee, & Minnick, 2011). However, some researchers conclude that there are no significant relationships (e.g., Ciuluvica, Amerio, & Fulcheri, 2014). When it comes to the impacts of two types of emotional regulation on life satisfaction, the results are largely consistent with the results of exploring basic relationships (e.g., Yiğit et al., 2014). This conclusion is supported by Hua and associates in a meta-analysis study (Hu, Zhang, & Wang, 2015), but there are also findings on the absence of these effects (Liliana & Nicoleta, 2014).

Behavioral Genetics Perspective of Satisfaction with Life and Emotion Regulation

Subjective well-being is a relatively new and unexplored construct in behavioral-genetic studies compared to some other psychological constructs (e.g., the intelligence or personality traits). The expansion of behavioral-genetic research of subjective well-being has began just at the end of the 20th century and the beginning of the 21st century. The contribution of genetic factors to the manifestation of various indicators of subjective well-being has varied from 0% for the positive affect (Baker, Cesa, Gatz, & Mellins, 1992) to 62% for the ability to achieve positive interpersonal relationships (Gigantesco et al., 2011). The most common finding is that genetic factors explain about 50% of variance in the manifestation of the general subjective well-being (Røysamb, Harris, Magnus, Vittersø, & Tambs, 2002; Røysamb, Tambs, Reichborn-Kennnerud, Neale, & Harris, 2003). In addition, genes may have a qualitatively different form of influence on these constructs: protective or plastic (e.g., Belsky et al., 2009). The results of various behavioral-genetic studies suggest that the genetic contribution to life satisfaction varies from 25% to 55% (Diener & Diener, 1996; Whisman, Rhee, Hink, Boeldt, & Johnson, 2014). Moreover, results of a Dutch study regarding the life satisfaction report on a contribution of 38% to the genetic factors (Stubbe, Posthum, Boomsma, & De Geus, 2005), similar to the findings in Bartels (Bartels, 2015) meta-analysis. In the same studies, the majority of the remaining variance in the life satisfaction is explained by the nonshared envionmental influences. Other genetic studies also emphase an importance of genetic factors in explaining the time stability of the life satisfaction (Lykken & Tellegen, 1996; Nes, Røysamb, Tambs, Harris, & Reichborn-Kjennerud, 2006; Pavot & Diener, 1993). The main results of the study that includes the largest number of indicators of subjective well-being suggest that the gene contribution to life satisfaction is 31%, while 69% of the variances are explained by the nonshared enviormental factors (Gatt, Schofield, Bryant, & Williams, 2014). Shared environmental factors do not contribute significantly in the manifestation of the life satisfaction.

Results of a behavioral-genetic study with experimental design have pointed out coefficients from 45% to 55% for genetic contributions to the emotional regulation (Weinberg, Venabes, Proudfit, & Patrick, 2014), and similar findingshave have been obtained in the research using self-assessment questionnaires (Canli, Ferri, & Dunman, 2009). In the study of Gat and associates (Gatt et al., 2014), the genetic contribution to the manifestation of the emotional suppression is 34%, and of the cognitive reappraisal is 19%, suggesting that the emotional component of regulation is more hereditary than the cognitive component. However, it seems that the emotional regulation in the light of hereditary and envionmental factors needs to be considered from a developmental perspective. At an early age, the manifestation of emotional regulation is mostly contributed by the nonshared environment, while the influence of genetic factors is negligible (Soussignan et al., 2009). With age, the genetic contribution is growing (Wang & Saudino, 2013), but the nonshared environmental influences remain dominant. Genetic factors play an important role in the manifestation of maladaptive patterns of the emotional regulation (Kanakam, Raoult, Collier, & Treasure, 2013). The results of some molecular-genetic studies (e.g., Ford, Mauss, Troy, Smolen, & Hankin, 2014; Grossman et al., 2011) provide support for behavioral-genetic studies on the heritability of various processes of emotional regulation. Genetic and enviornmental influences in the manifestation of cognitive reappraisal of positive and negative emotions have not been investigated so far. However, longitudinal studies have confirmed the stability of positive and negative affects, as well as personality dimensions (Canli, Silvers, Whitfield, Gotlieb, & Gabrieli, 2002; Chunningham, Van Barel, & Johnson, 2008; Kim & Hamann, 2007; Schwartz et al., 2003), and executive functions (e.g., Ochsner, Silver, Buhle, 2012) related to their manifestation, which support the thesis of the heritability of these constructs. It is therefore possible that different types of cognitive reappraisal have a certain hereditary component, but so the contextual factors in explaining their etiology cannot be ignored either.

The Present Study

Since the satisfaction with life and the emotional regulation are both important determinants of the subjective well-being, it seems that understanding of ethiology and nature of their relationships is essential in the field of mental health. Also, the two types of cognitive reappraisal remain, until now, unexplored in the light of hereditary and central factors, as well as the evidence of their different physiological bases (Mauss & McRae, 2016). This provides an additional need to specify etiology of their interrelations, as well as with other well-being indicators. The main aim of this study is to assess genetical and environmental factors that contribute to the connection among life satisfaction measurements and the emotional regulation. The contribution of certain sources of variance in the manifestation of these constructs is tested with a multivariate biometric method (Neale & Maes, 2004).

Method

Sample and Procedure

The study involved 364 twins (242 monozygotic and 122 dizygotic) who have grown up together. The respondents were 18 to 48 years old, and the average age was 24.59 (*SD* = 7.11). Out of the total sample, 23 pairs of monozygotic twins and 9 pairs of dizigotic twins were male, 98 pairs of monozygotic twins and 24 pairs of dizigotic twins were female, and 28 dizigotic pairs of twins were of different sexes. The zygosity of twin pairs was determined by DNA analysis of buccal swab. The sample included twins from the whole territory of Serbia, with a slightly higher number of twins from Vojvodina. Respondents were recruited as a part of the national project. A call for participation in the research was published through the media and press. Data collection was carried out in Novi Sad, Niš, Novi Pazar, Zrenjanin and Belgrade. The participation of the twins was voluntary, and each respondent signed an information consent for participation.

Instruments

Emotion Regulation Questionnaire (ERQ: Gross & John, 2003). ERQ contained 10 items that measured two strategies of emotional regulation: Cognitive Reappraisal and Emotional Suppression (e.g., *I keep my feelings for myself*). The Cognitive Reappraisal strategy consiseds of two specific scales (Popov, Dinić, & Janičić, 2016): cognitive reappraisal of negative emotions (Negative Cognitive Reappraisal; e.g., *When I face a stressful situation, I make myself think about it in a way that helps me stay calm*), and cognitive reappraisal of positive emotions (Positive Cognitive Reappraisal; e.g., *I control my emotions by changing the way I think about the situation I'm in*). The responses to each item ranged from 1 - *Generally I do not agree* to 7 - *I completely agree*. The Cronbach reliability coefficient was .72 for the scale of Emotional Suppression, .63 for the Negative Cognitive Reappraisal, and .66 for the Positive Cognitive Reappraisal. In the previous research in Serbian sample (Popov et al., 2016), the ERQ also showed satisfactory psychometric characteristics.

Satisfaction With Life Scale (SWLS: Diener, Emmons, Larsen, & Griffin, 1985; Serbian version: Vasić, Šarčević, & Trogrlić, 2011). This scale was used to assess the cognitive component of satisfaction with life. The responses to each of the five items (e.g., *In most ways my life is close to my ideal*) range from 1 - S*trongly disagree*, to 7- S*trongly agree*. This scale was widely used, and it showed good psychometric properties in previous research. Cronbach's alpha coefficient for SWLS (.83) was also acceptable.

Results

Descriptive Statistics and Gender Differences

The preliminary analysis involved a partialisation of the gender effect, as well as the linear and quadratic partialization of the age effect. Partialization of these effects was conducted by using the standard regression procedures which were proposed by McGue and Bouchard (McGue & Bouchard, 1984). Table 1 shows a descriptive statistics for the used variables. According to Tabachnick & Fidell (2013), it can be concluded that all variables, except satisfaction with life, are normally distributed (skewness and kurtosis are lower/higher than 1.50/-1.50). The measure of satisfaction with life has been normalized by Tuckey transformation. Gender differences are detected only on the dimension of Emotional Suppression in favour of males (t = 3.57, p < .01, η^2 = .14).

Table 1
Descriptive statistic for the used variables

	Monozygotic				Dizygotic			
	M	*SD*	*Sk*	*Ku*	*M*	*SD*	*Sk*	*Ku*
Satisfaction with Life	4.92	1.13	.68	7.01	4.84	1.00	0.07	2.28
Emotional Suppression	3.40	1.19	0.20	-0.54	3.45	0.93	0.13	-0.55
Positive Cognitive Reappraisal	4.34	1.17	-0.37	0.04	4.42	0.94	-0.60	-0.28
Negative Cognitive Reappraisal	5.27	0.87	-0.29	-0.20	4.04	0.92	0.67	0.99

Note. M – mean, *SD* – standard deviation, *Sk* – skewness, *Ku*– kurtosis.

Relations between Emotion Regulation Strategies and Satisfaction with Life: Cross Twin – Cross Trait Correlations

Table 2 presents the coefficients of intraclass correlations, as well as cross twin-cross trait correlations. Both types of correlation coefficients have been calculated separately for the MZ and DZ group. According to Rijsdijk & Sham (2002), intraclass correlation represents a more adequate measure of similarities between twins than ordinary Pearson's correlations. The MZ-DZ correlation pattern indicates a relative share of different sources of variance in the design of the tested constructs.

Table 2
Intraclass and cross twin – cross trait correlations

	Satisfaction With Life		Emotional Suppression		Positive Cognitive Reappraisal		Negative Cognitive Reappraisal	
	MZ	DZ	MZ	DZ	MZ	DZ	MZ	DZ
Satisfaction With Life	.54**	.42**						
Emotional Suppression	.11	.16	.38**	.20*				
Positive Cognitive Reappraisal	.03	.19	-.05	.04	.28**	.26**		
Negative Cognitive Reappraisal	.25**	.07	.07	.22*	.07	.07	.25**	.01

Notes. MZ – monozygotic twins, DZ – dizygotic twins. Diagonal numbers represent intra-class, while the remaining ones represent cross twin-cross trait correlation coefficients.
* $p < .05$. ** $p < .01$.

When the tested correlation between MZ twins was twice high as the tested correlation between DZ twins, then the influence of genetics was more crucial for the formation of phenotype, and probably both types of genetic effects shaped the examined construct. In both samples, the cross twin – cross trait correlations in the group of monozygotic twins were consistently higher than the correlation of the variables in the group of dizygotic twins. This correlation pattern provided evidence that genetic factors were likely to significantly contribute to covariance between emotion regulation strategies and satisfaction with life. The largest correlation difference was detected in the case of Negative Cognitive Reappraisal ($\Delta r = .24$), while the smallest correlation difference was detected in the case of Positive Cognitive Reappraisal ($\Delta r = .02$).

Genetic Structural Modeling: Comparison of the Multivariate Models

For the purpose of specifying the form of the observed covariants among the emotion regulation strategies and satisfaction with life, multivariate Independent Pathway Models and Common Pathway Models were tested. A comparison of the two groups of models, as well as the comparison between full (ACE, ADE) and reduced (AC, AE) models, was carried out by using several fit indicators. Analysis parameters were calculated by using the method of maximum likelihood. Model evaluation was conducted based on the Akaike Information Criterion (AIC: Akaike, 1973), Bayesian Information Criterion (BIC; Schwarz, 1978), comparative fit index and the Tucker–Lewis Index (CFI and TLI – optimal values higher than .95, acceptable higher than .90), the root mean square error of approximation (RMSEA - optimal values lower than .05, acceptable lower than .08) and the quotient $\chi 2/df$ (recommended < 2) (Ching–Yun, 2002; Kline, 2010). By testing different models of genetic and environmental impacts on the constructs related to life satisfaction and emotional regulation, it was found that the best fit had an independent AE model ($\chi^2(56) = 67.95$, $p = .13$, CFI = .95, TLI = .94, RMSEA = .03, AIC = 99.95, BIC = 7335.7). The estimation of the parameters of the independent AE model is given in Table 3.

Table 3
Parameters estimation of the AE independent model

	Satisfaction with Life	Emotional Suppression	Positive Cognitive Reappraisal	Negative Cognitive Reappraisal
Ac^2	.13 (.08 -.23)	.01 (.01 -.02)	.08 (.03-.18)	.28 (.10 -.56)
As^2	.40 (.20-.81)	.36 (.23 -.52)	.17 (.13 -.29)	.00 (.00-.00)
ΣA	.53	.37	.25	.28
Ec^2	.01 (.00-.01)	.04 (.00 -.11)	.75 (.38 -.84)	.10 (.05 -.20)
Es^2	.46 (.18 -.67)	.59 (.40-.75)	.00 (.00 -.03)	.62 (.29 -.86)
ΣE	.47	.63	.75	.72

Note. Ac^2 - common genetic factor, As^2-unique genetic factor, ΣA^2 - total genetic variance, Ec^2–common nonshared environmental factor, Es^2– unique nonshared environmental factor, ΣE^2 - total environmental variance.

Heritability is higher only in the case of life satisfaction (53%), while in other cases the environmental influence is crucial for manifestation of the investigated phenotypes. Heritability on the most of tested variables refers to specific genetic factors, except in the case of negative cognitive reappraisal, where the overall variance of heredity is explained by general (common) genetic factors. Only in the case of positive cognitive reappraisal, the general factor has a greater impact than the specific factors of the nonshared environment.

Table 4
Genetic and non shared environmental contributions to phenotypic correlations between life satsfaction and different types of emotion regulation

Sources of variance	r_f	*Ac(%)*	*Ec(%)*
Satisfaction with life X emotional suppresion	.06	64	36
Satisfaction with life X negative cognitive reappraisal	.22	86	14
Satisfaction with life X positive cognitive reappraisal	.19	53	47
Emotional suppresion X positive cognitive reappraisal	.20	14	86
Emotional suppresion X negative cognitive reappraisal	.12	35	65
Negative cognitive reappraisal X positive cognitive reappraisal	.43	45	55

Note. r_f – coefficient of phenotypic correlations, *Ac* - common genetic factor, *Ec* - common nonshared environmental factor.

Phenotypic correlations between life satisfaction and various manifestations of emotional regulation are low (.06 ≤ *r* ≤ .22), and the share of genetic factors in the covariance of these measures ranges from 53% to 86% (Table 4). Nonshared environmental factors explain significantly less of covariations, except in the case of Positive Cognitive Reappraisal where genetic and environmental factors are almost equally meritorious for correlation of these measures. Phenotype correlations between the measures of emotional regulation are low to moderate (.12 ≤ *r* ≤ .43) and in all cases the nonshared environmental factors contribute more to their covariation (55% - 86%) than genetic factors. Genetic factors potentially have a marginal role only in the case of covariation between the two types of cognitive reappraisal (45%).

Discussion

The main aim of this study was to explore the nature of the relationship between life satisfaction and various types of the emotional regulation by using multivariate genetic analysis.

It was found that genetic factors explained 53% of the life satisfaction variance. The specific genetic factors explained about 81% of its total heredity, while the general genetic factor explained 19% of the heredity of the construct. Such findings were consistent with several results of the previous behavioral-genetic studies of the life satisfaction (Diener & Diener, 1996; Whisman et al., 2014). According to some researchers (Lykken & Tellegen, 1996; Pavot & Diener, 1993), gene-based basis of life satisfaction was to be found in more stable constructs, such as personality traits, which represented a more time-firing disposition than the life satisfaction itself, and determined its baseline level. The impact of nonshared environmental factors on the level of the life satisfaction (47%) was manifested almost completely through the influence of specific factors in the non-shared environment. Due to the fact, it seemed that variable enviornmental factors significantly influenced the manifestation of life satisfaction, but their nature could not be precisely defined. They depended on individual experiences of an individual, while life events had a moderate moderation effect on life satisfaction. More precisely, the variable characteristics of nonshared environmental factors affected the level of life satisfaction, but not for a long time, i.e. only in certain time frames during which there were strong consequences of life events on functioning of an individual (Pavot & Diener, 1993). After this acute period, during which there were strong consequences of life events, the satisfaction with life returned to its basic level.

It has also been found that the nonshared environmental factors have the strongest influences (63%) on emotional suppression. This finding is in line with the assumptions of Kim and the associates (Kim et al., 2011) who argue that the everyday environment is the most important for the way of expressing emotions. If an individual, inclined to express emotions, approaches a specific environment that does not support emotional exchange, there is a greater chance of reporting the suppression of different emotions with the aim of not expressing it. The specific genetic influence in the manifestation of emotional suppression is not negligible (36%, or almost 100% of the total genetic influence), and explanations can firstly be found in relations between activities of certain physiological structures (e.g., amygdala) during emotional processing, and personality traits, such as extraversion and neuroticism (Canli et al., 2002), or inhibition of temperament (Schwatrz et al., 2003). Therefore, the genetical contribution to the emotional suppression seems to be explained first by genetic bases that it partly shares with the personality traits, or through the partial moderation effects of personality traits, such as stable dispositions, on manifestation of the emotional regulation.

Previous behavioral-genetic studies were not conducted for the purpose of specifying genetic and environmental factors of different types of cognitive reappraisal of emotions. In the present study, higher effects of nonshared environmental factors were determinate for both types of the cognitive reappraisal (75% and 72%), while genetical contributions were somewhat lower (27% and 26%). The most noticeable difference between these two types of cognitive reappraisal were contributions of general genetic factors, since its influence on the reformulation of positive emotions was low, while the influence on the reformulation of negative emotions was high (100% of total genetic impact). This difference could be explained in the light of various neural processes, having the same physiological basis. Namely, the amygdala played an important role for both types of the cognitive reappraisal. It was activated both in the cases of cognitive reappraisal of positive and negative emotions. However, some researchers argued that in the case of cognitive reappraisal of positive emotions, the amygdala was sensitive to new and positive events affecting an individual, and therefore the greater activity of the amygdala was recorded, while in situations of negative events this was not the case (Chunningham et al., 2008; Kim & Hamann, 2007). This is in accordance with the obtained finding that specific nonshared environmental influences better explains the cognitive reappraisal of positive emotions than of negative emotions. It is possible that certain physiological structures are basically reactive to emotional stimuli, but that these structures are further stimulated, due to everyday positive and pleasant stimuli from the environment that are specific to the individual. Therefore, for the greater activity of these structures in the process of the cognitive reappraisal of positive emotions, environmental factors play a "plastic" role, while in the case of the reappraisal of negative emotions, the same neural structure has a predisposed "protection" effect. Furthermore, that is in line with the claims of Belsky and associates (Belsky et al., 2009) that genetic factors influence different indicators of well-being through "protection effects" or "effects of plasticity" in the context of their sensitivity to negative or positive environment. Findings of this study support the discussion on genetic influences: genetic factors potentially have significance in the case of covariation between the cognitive reappraisal of positive and negative emotions (45%). In addition, it seems that the general genetic influence on manifestation of the cognitive reappraisal of negative emotions has the connection with different executive functions and their neural correlates (e.g., Ochner et al., 2012), and thus greater specific genetic influences to its manifestation. However, these assumptions should be taken with reserve, since the variables mentioned have not been a part of this study.

An insight into phenotypic correlations of the life satisfaction and the emotional regulation suggests that these are low-correlation constructs. The same finding is obtained if only specific forms of the emotional regulation are considered, except in the case of the cognitive reappraisal of positive and negative emotions, where a moderate coefficient of correlation is detected. A potential explanation for this result can be found in personalty factors, which significantly affect life satisfaction and the emotional regulation (Canli et al., 2002; Diener & Diener, 1996), and which are genetically determined to a large extent.

The obtained findings suggest a certain kind of assumption that can be considered as potentially important guidelines in the field of mental health. Namely, it seems that genetic factors are more important than environmental ones in explaining life satisfaction, and it is likely that various interventions carried out in order to increase the level of global satisfaction and well-being need to be focused on indirect factors that determine the satisfaction with life. On the other hand, some future studies of genetic and environmental factors of the emotional regulation could continue focusing on neural structures that are responsible for the emotion of emotions. However, at the same time, it is important to pay attention to the environmental factors involved in shaping the way of processing and overcoming emotions that cause an expression of strong positive or negative affect.

With this in mind, the need for more extensive and complete testing of these constructs in a behavioral-genetic paradigm can be identified. This would include other potential determinants of subjective well-being, such as personality traits or exquisite functions. Still, some of the limitations of the presented study would relate to the chosen type of design, a transversal one. Longitudinal tracking would enable stability of genetic and environmental influences to be detected, as well as as their changes over time. Besides usage of somewhat more reliable measures of emotional regulation, another addition to this research would be a sample of a larger age range, since we can not assume an equal manifestation of the level of life satisfaction in different developmental periods.

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GENSKI I SREDINSKI ČINIOCI EMOCIONALNE REGULACIJE I ZADOVOLJSTVA ŽIVOTOM: BLIZANAČKA STUDIJA

Ekspanzija istraživanja indikatora mentalnog zdravlja krajem XX veka velikim delom stavlja faktore blagostanja u fokus interesovanja savremene psihološke nauke. Međutim, tek noviji rezultati bihejvioralno-genetičkih studija pružaju potpunu sliku o faktorima koji utiču na indikatore subjektivnog blagostanja kroz specifikaciju etiologije njihovog odnosa. Osnovni cilj ovog istraživanja usmeren je na procenu genskih i sredinskih činilaca koji utiču na kovariranje među merama zadovoljstva životom i emocionalne regulacije. Istraživanje je obuhvatalo 182 parova blizanaca (121 para monozigotnih i 61 para dizigotnih), oba pola, u starosnoj dobi 18 - 48 godina. Udeo pojedinih izvora kovariranja između ispitivanih fenotipova testiran je multivarijatnim biometrijskim metodom. Genski činioci objašnjavaju nešto veći deo varijanse zadovoljstva životom (53%), dok sredinski činioci imaju većinski udeo u objašnjenju različitih tipova emocionalne regulacije. Opšti genski činioci potencijalno su značajni samo u objašnjenju kognitivne preformulacije negativnih događaja, dok u ostalim slučajevima veća važnost pripada sredinskim faktorima. Uvid u fenotipske korelacije navedenih mera ukazuje na to da je reč o konstruktima koji ostvaruju niske do umerene korelacije, te da genski činioci imaju potencijalni značaj (45%) samo u slučaju kovariranja dve vrste kognitivne preformulacije događaja.

Ključne reči: blizanačka studija, emocionalna regulacija, emocionalna supresija, kognitivna preformulacija, zadovoljstvo životom