The Structure of Hardiness, its Measurement Invariance across Gender and Relationships with Personality Traits and Mental Health Outcomes

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Abstract

A great number of research suggests that hardiness acts as a protective factor in stressful situations, especially in work context. In the present research the factor structure of Dispositional Resilience Scale (DRS; Bartone, Ursano, Wright, & Ingraham, 1989), and its factorial invariance across gender was examined. Furthermore, the relationships of hardiness to five-factor personality traits and several mental health outcomes (positive affect, negative affect and physical symptoms) were also explored. Research was carried out on the sample of 597 employees from different companies.

Five hypotheses about the structure of this scale were tested by using confirmatory factor analysis. The results mostly supported one-factor structure of abridged version of DRS (12 items), from which three negatively oriented items originally aimed at measuring challenge were excluded. Regarding measurement invariance across gender, the results of multi-group confirmatory factor analysis show that factor loadings are invariant across the samples of men and women, but error variances of items were not equivalent across samples. Furthermore, the results show that hardiness scales are in low to moderate correlations with five-factor personality traits, suggesting that they could not be subsumed under the five-factor personality traits. Hierarchical regression analyses show the incremental effect of abridged hardiness scale over five-factor personality traits in predicting mental health measures. Predictive strength of hardiness was the highest for positive affect, and considerably lower for negative affect and subjective physical symptoms.

Keywords: hardiness, five-factor personality traits, positive affect, negative affect, physical symptoms, measurement invariance

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Introduction

The construct of hardiness was first introduced by Kobasa (1979), who defined it as a resistance resource in the encounter with stressful situations. It is considered as a pattern of personality characteristics comprising three mutually related dispositions - commitment, control, and challenge. Dimension of control is defined as a tendency to believe and act as if one can influence the life events through one's own effort. Commitment refers to the tendency to involve oneself in the activities in life and have a genuine interest in and curiosity about the activities, things and other people, while challenge refers to the belief that changes in life are opportunities for personal growth.

Individuals high on hardiness try to influence the outcomes of the life events, are actively engaged in them and, notwithstanding their positivity or negativity, try to learn something out of them. On the other hand, individual low on hardiness will be more likely to withdraw from some life circumstances and perceive them as more threatening (Maddi, 1999). It is suggested that hardiness acts as a protective factor in stressful situations predominantly through cognitive appraisal and coping behaviors. Namely, persons high on hardiness approach life demands actively and perceive that they can handle them successfully, view them as meaningful and useful, which results in less stressful experience (Maddi, 1990). Protective function of hardiness could be seen in its impact on the choice of the situations that one will be involved with. Namely, the effects of hardiness on cognitive appraisal and coping efforts refer only to the individual differences in the reactions to actual stressful situations. However, hardiness does not influence only the appraisal of actual stressful situations, but also the evaluation of past experience, the appraisal of costs and benefits of various behaviors, and therefore, the choice of important, meaningful and challenging situations. Thus, hardiness does not influence only the reactions to the stressful stimuli, but can also lead to qualitatively different experiences (Wiebe & Williams, 1992).

The effects of hardiness on various outcomes have been investigated mostly in the work context. In one of the first studies dealing with this topic, Maddi and Kobasa (1984) tried to identify managers that proved to be successful when working in the stressful work conditions and to differentiate them from those who manifest problems at the individual as well as job level. Hardiness was found to be a key variable that differentiates these two groups of managers. Studies dealing with the effects of hardiness on health outcomes showed that hardiness is negatively related to physical symptoms in highly stressed individuals (Kobasa, 1979), and prospectively related to the lower probability of symptom appearance. Furthermore, the main effect of hardiness on subjective physical symptoms depends on the job stressfulness (Kobasa, Maddi, & Kahn, 1982). Since theoretical model of hardiness implicates that it may be learned, from the beginning the research had practical implications in the domains of work and organizational psychology mainly aimed at planning stress management programs (Walton, 1990).

Prompted by the aforementioned studies, numerous authors tried to explain the effects of hardiness on various work-related outcomes, out of which professional burnout has generated most interest. Research indicates that hardiness is negatively related to professional burnout, and especially in the professionals working in mental care and education (Chan, 2003; Simoni & Paterson, 1997). Also, recent studies have found the relationships of hardiness with many health outcomes on the samples of healthy people in various professions as well as on persons with different illnesses. For example, hardiness is associated with lower blood pressure (Maddi, 1999), physiological responsivity that constitutes less risk of heart disease and other illnesses (Contrada, 1989; Rhodewalt & Zone, 1989), and fewer signs of psychopathology (Maddi & Khoshaba, 1994). Results also indicate that hardiness helps in the maintenance and enhancement of performance, leadership, morale, and health despite the presence of significant stressful circumstances (Maddi et al., 2002). Furthermore, Dolbier et al. (2000) have found that individuals high on hardiness have significantly higher proliferative responses to antigens and mitogens than individuals lower on this trait. A study conducted on soldiers participating in peacekeeping operations showed that those higher on hardiness were able to find more meaning in their activities, which was, after their termination, connected with some benefits, as for example better personal experience and better abilities to cope with stressful situations (Britt, Adler, & Bartone, 2001). Recent research suggests that hardiness in interaction with work conditions has prospective effects on objective health outcomes. Hystad, Eid, and Brevik (2011) investigated the prospective effects of psychological hardiness, job control, and job demands on medically certified sickness absence. After controlling for age, sex, and baseline absence, hardiness predicted both the likelihood of having any sickness absence and the number of absence spells. In addition, an interaction was found among hardiness, job control, and psychological demands. When demands were high, high job control was associated with more absence among employees lower on hardiness. Their results show that psychological demands in the work environment had a stronger negative impact on employees with low levels of hardiness under conditions of high, as opposed to low job control. Research dealing with work injuries suggests that participants higher on hardiness are less likely to fall ill and have less work injuries requiring hospitalization (Greene & Nowack, 1995). It should be noted that research shows that dimensions of hardiness are not equally important for health outcomes. Namely, dimensions of control and commitment seem to be more important than dimension of challenge (Clark & Hartman, 1996).

Although much less, hardiness has also been investigated in the contexts of other work outcomes, such as attitudes towards work and organization and work-related behaviors. Studies have found that hardiness is positively related to job satisfaction (e.g. Cash & Gardner, 2011). Employees high on hardiness see their job in better light, are more committed to their organizations (Sezgin, 2009), have more responsible work behaviors and are more efficient in stressful tasks (Manning, Williams, & Wolfe, 1988). Persons higher on hardiness use adaptive coping

strategies more frequently (e.g. active and problem-focused strategies), and non-adaptive strategies (e.g. avoidance) less frequently (Cash & Gardner, 2011; Simoni & Paterson, 1997). Furthermore, they have better and wider social networks which provide them with support in the situations requiring coping with work stress, and they report higher levels of social support by co-workers and supervisors (McCalister, Dolbier, Webster, Mallon, & Steinhardt, 2006). All these indicate that persons higher on hardiness are better equipped to manage work stress.

Several scales have been used for measuring hardiness, some of them specifically constructed to measure this construct, while others intended to measure other constructs but proved to be eligible for measuring some of the components of hardiness (e.g. I-E scale for measuring control) (Funk, 1992). The most frequently used hardiness measures are *Personal Views Survey* (PVS; Hardiness Institute, 1985), and *Dispositional Resilience Scale* (DRS; Bartone et al., 1989), that belong to the third generation of hardiness measures (Funk, 1992). Compared to the previously used measures, third generation scales have better psychometric properties, although still not good enough. They contain some positively oriented items that do not measure lack of hardiness which was the case in the majority of previous measures (Funk, 1992).

The results of factor analyses mainly support expected three-factor structure, with control and commitment being highly related, while challenge relatively weakly related to other two dimensions (Funk, 1992).

One important problem related to the measures of hardiness is the possibility that they measure neuroticism (Wiebe & Williams, 1992). There are several reasons for this hypothesis. First, some items from the existing hardiness measures refer to the depressive and hostile reactions that are integral part of neuroticism. For example, Sinclair and Tetrick (2000) have found the highest overlap between negatively oriented hardiness items and neuroticism. Second, we frequently conclude about the level of hardiness from the measures referring to the negative aspects of personality functioning, i.e. maladjusted personality. For example, high level of commitment is sometimes inferred on the bases of the low scores on alienation scale. Since various aspects of maladjusted personality are saturated highly with neuroticism, it could be expected that hardiness could reflect emotional stability as well (Funk & Houston, 1987). Even the third generation of hardiness scales contains negatively oriented items, so that this problem also refers to them. Third, numerous empirical studies using various measures of hardiness and neuroticism have found that these personality characteristics correlate from -.30 to -.50 (Funk, 1992). Although the size of these correlations does not imply that they are identical constructs, but rather that there is a moderate overlap between them, the correlation between hardiness and neuroticism is almost the same as the correlations between various measures of hardiness. Furthermore, research indicates that relationships between hardiness and physical symptoms become nonsignificant if the effect of neuroticism is controlled for (Funk & Houston, 1987;

Rhodewalt & Zone, 1989). Although some studies show that associations between hardiness and outcome variables, particularly mental health outcomes, remain significant even after neuroticism is statistically controlled for (e.g. Allred & Smith, 1989), it seems that measures of hardiness partly include neuroticism. Additionally, all three components of hardiness have moderate to high correlations with negative emotions (Kravetz, Drory, & Florian, 1993).

It should be noted that original hardiness measures are developed mainly for the identification of the characteristics adaptive for male employees and, therefore, they might be less adequate for females. Namely, for the use of measuring instruments there is a critical assumption that they measure the same trait in all groups. If that is true, the comparisons and analyses of those scores are acceptable and render meaningful results. But if that assumption is not true, then such comparisons and analyses do not yield meaningful interpretations. Therefore, the main aim of this study is to examine factor structure of Dispositional Resilience Scale (DRS; Bartone et al., 1989) in Croatian language, and its factorial invariance on the sample of employed men and women. Furthermore, we examined the relationships of hardiness with personality traits and several mental health outcomes.

Method

Participants and Procedure

Total number of 597 participants, 322 (53.9%) women and 275 (46.1%) men participated in the study. They were recruited randomly from various administration, management and technical jobs in private and public companies in several towns. Their age ranged from 19 to 63 years (M=40.49; SD=8.67). The majority finished high school (56.8%), 15.1% elementary school, and 28.1% had university diploma. At the time of the investigation all participants were employed and the great majority of them married (76.2%). Self-report questionnaires had been distributed by trained interviewers. The investigation was anonymous and was carried out in groups in the workplace of participants.

Instruments

As a measure of hardiness *Dispositional Resilience Scale* (DRS; Bartone, 1995; Bartone et al., 1989) was used. This scale belongs to the third generation of hardiness measures that have better psychometric characteristics than previous ones and contain also positively oriented items, meaning that they do not measure lack of hardiness, which was the case with the majority of the previous measures (Funk, 1992). The scale contains 15 items, with each component of hardiness (commitment, control and challenge) measured by 5 items. Previous research shows that it has good psychometric characteristics. Coefficients of internal

consistency (Cronbach alpha) for hardiness components ranged from .70 to .77, while for the whole scale is .83 (Bartone, 1995). Also, the results obtained on the various samples of participants confirm the criterion and predictive validity of this scale (Bartone, 1995). The participants assessed the degree to which each item describes them on a 4 point rating scale (0 - *completely not true*, 3 - *completely true*).

Big Five Inventory (BFI; Benet-Martinez & John, 1998) was used for measuring five-factor personality model. The BFI uses short phrases to assess the most prototypical traits associated with each of the big five dimensions. It consists of 44 items, and was constructed to allow quick and efficient assessment of five personality dimensions when there is no need for differentiated measures of particular facets. Self-report ratings for each item were made on a 5 point rating scale (1 - *strongly disagree* to 5 - *strongly agree*). Factor structure of the inventory on Croatian language was tested by confirmatory factor analysis, and goodness-of-fit indices obtained show five-factor structure to be appropriate (Kardum, Gračanin, & Hudek-Knežević, 2008). Internal consistency coefficients (Cronbach alpha) on the sample of participants in this study were .73 for extraversion, .69 for agreeableness, .78 for conscientiousness, .80 for neuroticism and .78 for openness. Correlations between the dimensions are low to moderate and range from -.44 ($p<.001$; agreeableness and neuroticism) to .44 ($p<.001$; extraversion and openness).

As a measure of perceived physical symptoms, *Pennebaker Inventory of Limbic Languidness* (PILL, Pennebaker, 1982) was used. The inventory consists of 54 items measuring the frequency of the symptoms and sensations from different body systems (e.g. racing heart, chest pain, indigestion, and diarrhea). Previous studies showed very good psychometric qualities of inventory translated and applied to Croatian population, indicating that it could be used as a valid measure of subjective physical symptoms (Hudek-Knežević, Kardum, & Lesić, 1999; Kardum, Hudek-Knežević, & Kalebić, 2004). Internal consistency (Cronbach alpha) of the inventory on the sample of participants used in this study was .92. Participants assessed the frequency of each symptom on a 5 - point rating scale (from 0 - *never* to 4 - *very often*, one to several times a week).

Mood was measured by a short form of adjective mood scale (Kardum & Bezinović, 1992), consisting of 40 adjectives. Participants assessed their usual mood by using five point rating scale (0 - *I never feel this way*, 4 - *I almost always feel this way*). Factor analyses of this scale produced two higher order factors that refer to the valence of the descriptors used and are most frequently named as positive and negative mood. Positive mood factor consists of three lower order factors reflecting various qualities of positive emotional states: joy, activation and acceptance. Negative mood factor consists of four lower order factors: sadness, anger, fear and rejection. Each factor contains 20 items, while the number of items for the lower order dimensions ranged from 4 to 11. Internal reliability coefficients

(Cronbach alpha) on the sample of participants of the present study were .89 for positive and .95 for negative mood. Positive and negative mood are significantly negatively correlated (-.46; *p<*.001).

Results

### *Structure of Dispositional Resilience Scale*

The structure of the Dispositional Resilience Scale was tested by confirmatory factor analyses using LISREL 8.30 (Jöreskog & Sörbom, 1999). Generally, normed fit index (NFI), comparative fit index (CFI) and goodness of fit index (GFI) $\geq$ .90, and root mean square error of approximation (RMSEA) $\leq$ .08 and root mean square residual (RMR) $\leq$ .10 indicate good model fit (Hu & Bentler, 1999; Kline, 1998; Schermelleh-Engel, Moosbrugger, & Müller, 2003). As it is well known chi-square statistic is conservative and sensible to sample size, and therefore, in larger samples it is rarely nonsignificant. Several authors suggest that χ^2/df can also be calculated (normed chi-square; NC), and values of less than 3 are considered favorable (Kline, 1998). Goodness-of-fit indices for all tested models are presented in Table 1.

Table 1. *Goodness-of Fit Indices for Five Confirmatory Factor Analyses of Dispositional Resilience Scale*

Goodness-of-Fit Indices	One Factor (15 Items)	Three Orthogonal Factors	Two Factors	Hierarchical Model	One Factor (12 Items)
Chi-square	$\chi2$=888.80 *df*=90 *p<*.001	$\chi2$=840.60 *df*=90 *p<*.001	$\chi2$=549.47 *df*=89 *p<*.001	$\chi2$=529.78 *df*=87 *p<*.001	$\chi2$=215.15 *df*=54 *p<*.001
Normed Chi-square (NC)	9.88	9.34	6.17	6.09	3.98
Normed Fit Index (NFI)	.58	.53	.69	.69	.83
Comparative Fit Index (CFI)	.61	.55	.73	.73	.86
Goodness of Fit Index (GFI)	.83	.84	.89	.89	.94
Root Mean Square Error of Approximation (RMSEA)	.12	.12	.09	.09	.07
Root Mean Square Residual (RMR)	.07	.09	.07	.07	.03

Several hypotheses about the structure of this scale were tested (Figure 1).

Figure 1. *Four Models of the Structure of DRS Scale*
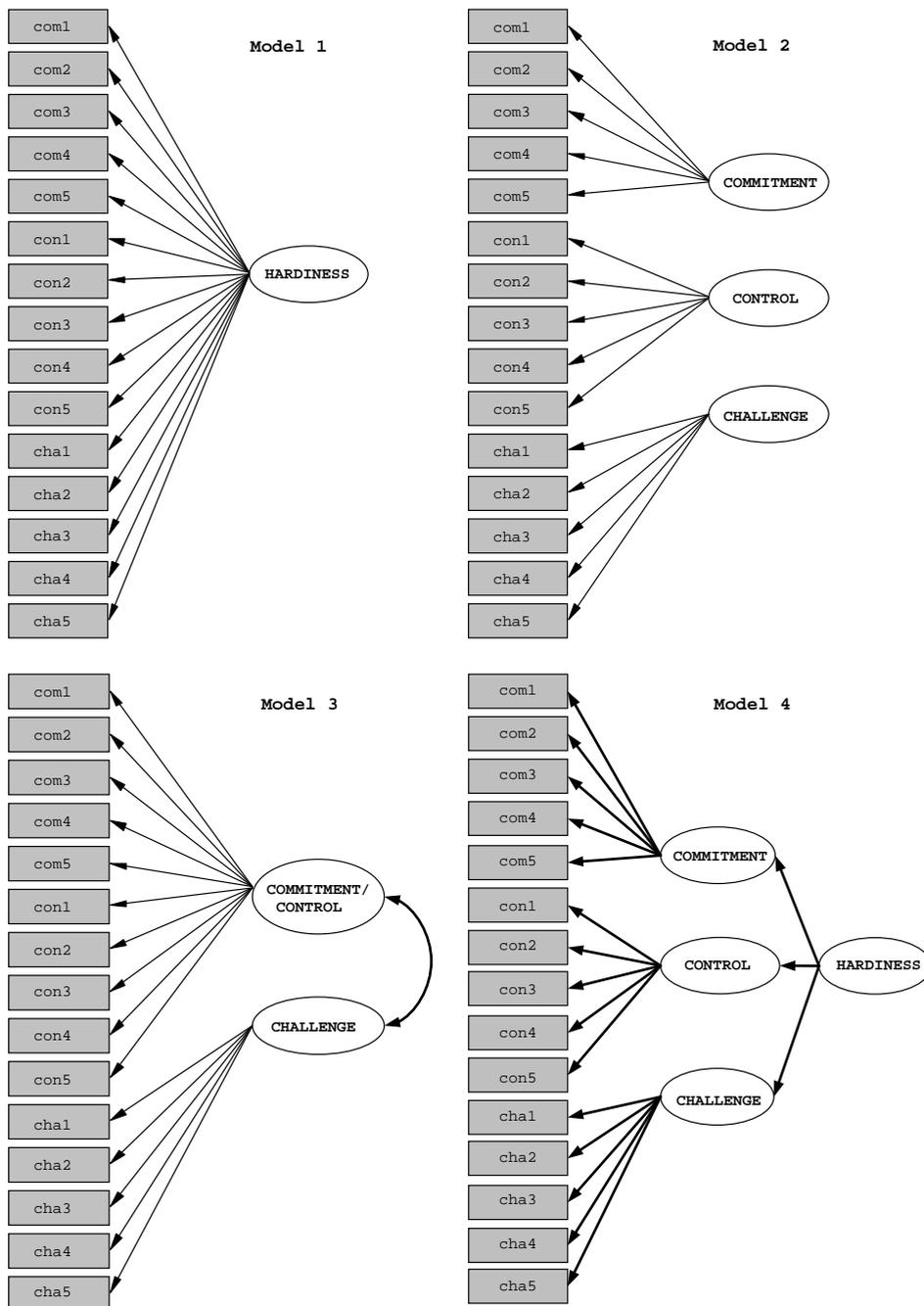
Model 1 - one factor (15 items); Model 2 - three orthogonal factors;
Model 3 - two correlated factors; Model 4 - hierarchical model

According to the original theoretical formulation of hardiness as a general personality style, we first tested the hypothesis of its one-factor structure (Model 1). The goodness-of-fit indices for this model were not satisfactory. It should be mentioned that three negatively oriented items originally belonging to challenge scale were very lowly saturated with general hardiness factor (items 3, 11 and 14).

Model with three orthogonal factors was also tested (Model 2), showing poor model fit (Table 1). Modification indices suggest that orthogonality between commitment and control is highly unrealistic and that we could improve the model fit by freeing the correlation between them. If the correlation between commitment and control is freed, very high correlation (.96) is obtained, suggesting that these two measures should be treated as one factor.

Therefore, two-factor model was tested, expecting commitment and control items to be saturated by one common factor and challenge items by the second factor (Model 3). All goodness-of-fit indices for this model were better than in the previous two. Namely, when Model 3 was compared to Model 2 it could be seen that Model 3 was much better than Model 2 ($\Delta \chi 2(1)=291.13$; $p<.001$). It should be noted that this model also does not have goodness-of-fit indices that are satisfactory enough.

Some recent research has found support for hierarchical structure of DRS, comprising general hardiness dimension, and three sub-dimensions (commitment, control and challenge) (Hystad, Eid, Johnsen, Laberg, & Bartone, 2010). Therefore, in order to obtain a better factor structure of this scale, we also tested the hypothesis of its hierarchical structure (Model 4). Although goodness-of-fit indices of this model were almost identical as in Model 3, the comparison of chi-squares of these two models showed that hierarchical model was somewhat better than the model of two oblique factors ($\Delta \chi 2(2)=19.69$; $p<.001$).

In all previously tested models several problems were observed, the most important being very high correlation between commitment and control scales, as well as the already mentioned problem concerning low loadings of the three negatively oriented items originally belonging to the challenge scale. Therefore, one more hypothesis about the structure of DRS was tested - hypothesis about general hardiness factor, but with negatively oriented challenge items excluded from the analysis. The goodness-of-fit indices for this model were better than indices in all of the previously tested models, with majority of them found to be satisfactory. The comparison of chi-squares with hierarchical model showed that one-factor model with 12 items was significantly better ($\Delta \chi 2(33)=314.63$; $p<.001$). Also, all 12 items were significantly saturated with general hardiness factor. The results of this analysis are presented in Figure 2.

Figure 2. *The Results of Confirmatory Factor Analysis of 12-item DRS Version*
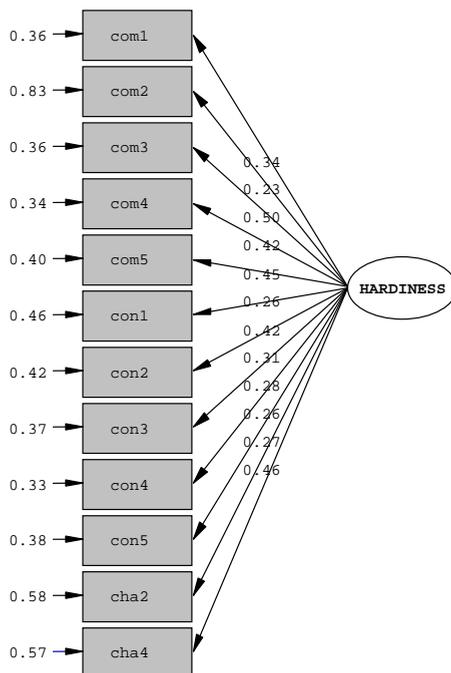
One-factor model of hardiness scale consisting of 12 items was used as the basis for testing the factorial invariance across male and female samples. First, the same one-factor structure of hardiness was tested separately on the samples of females and males. The goodness-of-fit indices obtained for female sample were: $\chi2(54)=184.73$, $p<.001$; NC=3.42; NFI=.72; CFI=.78; GFI=.91; RMSEA=.09; RMR=.04, while for male sample: $\chi2(54)=112.38$, $p<.001$; NC=2.08; NFI=.83; CFI=.90; GFI=.94; RMSEA=.06; RMR=.03. All 12 items are significantly saturated with one general hardiness factor on the both samples. It could be concluded that indices-of-fit obtained were somewhat better in men than in women.

An examination of measurement invariance enables to determine whether the items and the underlying constructs mean the same thing to women and men. Therefore, we used multi-group confirmatory factor analysis to conduct a sequence of increasingly more restrictive tests of invariance across female and male samples. General model used for comparison was defined as the sum of chi- squares and their degrees of freedom across both samples ($\chi2(108)=297.11$, $p<.001$; NC=2.75; NFI=.78; CFI=.84; GFI=.92; RMSEA=.08; RMR=.04).

Usually, $\Delta\chi2$ has been used as the index of difference in fit, although it has been criticized because of its sensitivity to sample size. However, the evidence exists that ΔCFI was not prone to this problem and there is a suggestion that a ΔCFI value higher than .01 is indicative of a significant drop in fit (Hu & Bentler, 1990).

The first hypothesis tested was that factor loadings are invariant across samples and the indices-of-fit obtained were: $\chi 2(120)=312.89$, $p<.001$; NC=2.61; NFI=.76; CFI=.84; GFI=.93; RMSEA=.07; RMR=.04. These constraints did not produce significant drop in fit. Namely, when the obtained chi-square was compared to chi-square of the general model, the difference was not statistically significant ($\Delta\chi 2(12)=15.78$), and ΔCFI was 0.

Furthermore, we tested for the invariances of the error variances of all items across both samples, and obtained the following indices-of-fit: $\chi 2(132)=349.29$, $p<.001$; NC=2.65; NFI=.74; CFI=.83; GFI=.92; RMSEA=.07; RMR=.04. These additional constraints produced significant drop of fit ($\Delta\chi 2(24)=52.18$, $p<.001$; ΔCFI=.01), which means that error variances were not equivalent across samples. Inspection of modification indices suggests that error variances were higher for females than males, which indicates lower item reliabilities in the sample of females. Consequently, on the sample of males Cronbach alpha reliability coefficient was .79, while on females .72.

All the analyses presented are preliminary steps for better understanding the structure of DRS in Croatian language and they cannot give us a conclusive answer to this question. However, it seems that 12 - items unidimensional structure is the most suitable solution. Therefore, this measure was used in all further analyses, but in some analyses it was compared to the other variants of hardiness measured by DRS (15-item hardiness scale and subscales commitment, control and challenge). Table 2 presents descriptive statistics for all variants of hardiness measures.

Table 2. *Means, Standard Deviations, and Cronbach Alpha Reliabilities for all Variants of Hardiness Measures*

Hardiness Scales	*M*	*SD*	Cronbach α
Hardiness 15	28.85	5.14	.70
Hardiness 12	24.38	4.79	.76
Commitment	10.39	2.47	.62
Control	10.45	2.07	.54
Challenge	8.01	2.59	.57

Note. Hardiness 12 - 12-items hardiness scale; Hardiness 15- 15-items hardiness scale.

Men achieved statistically significant higher scores on 12-items hardiness scale ($t=2.05$; $p<.05$) and control scale ($t=2.29$; $p<.05$). Also, all variants of hardiness measures were significantly positively related to educational level (.18 for 15-items hardiness scale, .16 for 12-ites hardiness scale, .18 for commitment, .09 for control and .10 for challenge), while neither of them were significantly related to age.

The Relationships between Hardiness and Five-factor Model of Personality

In order to obtain additional information concerning construct validity of hardiness scales the relationships between them and five-factor personality traits were computed. Pearson correlation coefficients, beta weights and coefficients of multiple correlations between five-factor personality traits and hardiness scales are presented in Table 3.

Table 3. *Relationships between Five-factor Personality Traits and Hardiness Scales*

| Hardiness Scales	E	A	C	N	O	R
Hardiness 15	.41***	.24***	.28***	-.38***	.40***	
	*.22***	.07	-.01	-.21***	.24***	.52***
Hardiness 12	.40***	.22***	.33***	-.37***	.39***	
	*.19***	.04	.09*	-.19***	.22***	.52***
Commitment	.34***	.21***	.25***	-.35***	.36***	
	*.15***	.05	.01	-.22***	.23***	.47***
Control	.31***	.17***	.34***	-.27***	.26***	
	*.15***	.01	.21***	-.10*	.10*	.41***
Challenge	.24***	.13***	.04	-.20***	.25***	
	*.17***	.09*	-.18***	-.12**	.18***	.34***

Note. Hardiness 15 - 15 items hardiness scale; Hardiness 12 - 12 items hardiness scale; E - Extraversion, A - Agreeableness, C - Conscientiousness, N - Neuroticism, O - Openness; R - Coefficient of multiple correlation; Correlation coefficients are presented using regular font, while β weights are presented in italic.

*$p<.05$, **$p<.01$, ***$p<.001$.

The results obtained show that 15-items and 12-items hardiness scales are very similarly related to five-factor personality traits. Both scales have the highest correlations with neuroticism, extraversion and openness, and lowest correlations with agreeableness. When components of hardiness are taken into account, it could be seen that commitment has the highest correlations with neuroticism, extraversion and openness, control with conscientiousness and extraversion, while challenge with openness and extraversion. Also, specific components of hardiness are somewhat differently related to five-factor personality traits.

Furthermore, the relationships between 12-items hardiness scale and five-factor personality traits were examined by using multidimensional scaling. The results of this analysis are presented in Figure 3.

Figure 3. *The Results of Multidimensional Scaling of Five-factor Personality Traits and Abridged Hardiness Scale*
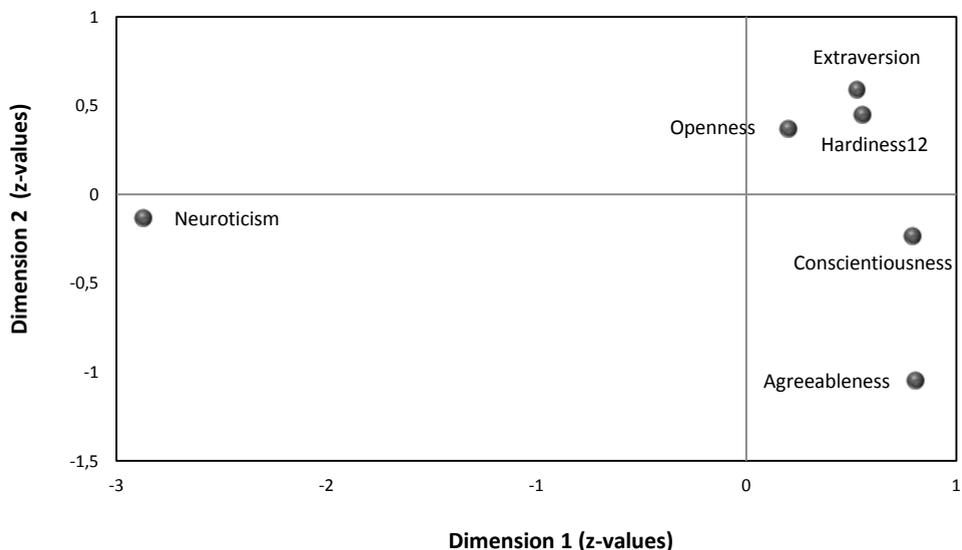
The first dimension was interpreted as negative-positive affectivity, while the second, in accord with hierarchically higher structure that explains correlations between five-factor personality traits as stability-plasticity. Namely, it seems that covariations between neuroticism, agreeableness and conscientiousness reflect ability and tendency towards maintaining emotional, social and motivational stability, while covariation between extraversion and openness reflects the ability to think and behave flexibly, as well as the tendency to explore new situations (De Young, 2006; Digman, 1997). It could be seen from Figure 3 that hardiness is primarily saturated with positive affectivity and plasticity. In other words, hardiness is on the opposite pole compared to neuroticism and very close to openness and extraversion.

The Relationships of Hardiness with Positive and Negative Affect and Subjective Physical Symptoms

Pearson correlation coefficients were computed between hardiness scales and positive and negative affect and subjective physical symptoms. These correlations are presented in Table 4.

*Table 4. Correlations of Hardiness Scales with Positive and Negative Affect
and Subjective Physical Symptoms*

Hardiness Scales	Positive Affect	Negative Affect	Subjective Physical Symptoms
Hardiness 15	.52***	-.40***	-.26***
Hardiness 12	.52***	-.39***	-.24***
Commitment	.52***	-.38***	-.24***
Control	.38***	-.30***	-.17***
Challenge	.24***	-.20***	-.16***

***$p<.001$.

Table 4 shows that hardiness scales are significantly correlated with all three mental health measures, with the highest correlations with positive affect, somewhat lower with negative affect, and the lowest correlations with subjective physical symptoms. Also, 15-items and 12-items hardiness scales are almost identically related to all three mental health outcomes. Regarding the components of hardiness, it should be noted that commitment has the highest, while challenge the lowest correlations with all outcome variables.

The relationships between hardiness and positive and negative affect as well as subjective physical symptoms were additionally examined by three hierarchical regression analyses. As indicated by several studies (e.g. Eschleman, Bowling, & Alarcon, 2010) as well as the results obtained in the present study (Table 3), hardiness showed low to moderate correlations with some basic personality traits. In order to examine whether hardiness predicts mental health outcomes beyond and above five-factor personality traits hierarchical regression analyses were performed with five-factor personality traits as predictors in the first step, and abridged hardiness scale in the second step of the analyses. The results are presented in Table 5.

Table 5. The Results of Hierarchical Regression Analyses

Positive Affect					
Predictors	β	R	R^2	F- Change	Total F
1. step (five-factor traits)		.60	.36		67.24***
2. step		.65	.42	66.24***	73.26***
Extraversion	.22***				
Agreeableness	.10**				
Conscientiousness	-.05				
Neuroticism	-.24***				
Openness	.11**				
Hardiness 12	.30***				
Negative Affect					
1. step (five-factor traits)		.65	.42		85.24***
2. step		.66	.43	19.75***	76.58***
Extraversion	-.20***				
Agreeableness	-.08*				
Conscientiousness	.01				
Neuroticism	.47***				
Openness	.10**				
Hardiness 12	-.16***				
Subjective Physical Symptoms					
1. step (five-factor traits)		.32	.11		13.83***
2. step		.35	.12	11.73***	13.69***
Extraversion	.01				
Agreeableness	.05				
Conscientiousness	-.03				
Neuroticism	.29***				
Openness	.05				
Hardiness 12	-.16***				

Note. Only β weights from the last step of the analyses are presented.

*$p<.05$, **$p<.01$, ***$p<.001$.

The results of hierarchical regression analyses show that abridged hardiness scale significantly predicts all three mental health measures beyond and above five-factor personality traits. Predictive strength of hardiness was highest for positive affect, and considerably lower for negative affect and subjective physical symptoms.

Discussion

Theoretically, hardiness is conceptualized as a general personality style consisting of three interrelated components (Kobasa, 1979). However, research on the structure of hardiness, notwithstanding the instruments measuring it, did not give clear answers about its dimensionality. Namely, some research suggested that hardiness is a unidimensional construct while others indicated that it is

multidimensional, i.e. consisting of three factors (Maddi, 1999). The results of the present study suggest that hardiness measured by DRS is best conceptualized as unidimensional construct. The best structure of DRS was obtained when three negatively oriented items from challenge dimension were dropped from the analysis. These results are partly similar to some research in which the structure of this scale was also analyzed. For example, Hystad et al. (2010) have found the hierarchical structure of this scale, comprising general hardiness dimension and three sub-dimensions (commitment, control, and challenge), which justify deriving sum score from the DRS items.

One of the problems related to the structure of hardiness is that its control and commitment dimensions are mutually highly interrelated, while challenge is relatively weakly associated with the other two dimensions (Funk, 1992). The results of the present study confirmed high correlation of commitment and control and relative independence of challenge dimension, which eventually resulted in unidimensional structure. Therefore, our results suggest that future measurement of the challenge dimension of hardiness should be refined. Other research has also identified some problems with the challenge dimension, which seems to be the most unique of the three hardiness components. For example, several researchers have found that only commitment and control have adequate psychometric properties and are systematically related to health criteria, suggesting that challenge be dropped from the conceptualization of hardiness (Florian, Mikulincer, & Taubman, 1995; Funk & Houston, 1987). However, a recent meta-analysis of hardiness on 180 samples found that although commitment is likely to be the most valuable component in predicting various criteria, all three components consistently explained unique variance in criteria, which is an indication that all three of them are important in the conceptualization of the hardiness construct (Eschleman et al., 2010).

The question about the structure of hardiness is also important for better understanding its effects on various outcome variables. Its multidimensional nature could implicate different mechanisms through which hardiness may exert its effects on various outcomes, and consequently, different components of hardiness may be related to different outcome variables. Some research results have confirmed this. For example, Contrada (1989) examined the relative importance of hardiness and its components in predicting cardiovascular changes during the performance of a stressful task. The results showed that only challenge dimension was related with diastolic blood pressure, and that the other dimensions and their combinations, including the overall hardiness score, did not significantly improve the prognosis of diastolic blood pressure. Regarding the prediction of mental health outcomes, Florian et al. (1995) have found that commitment and control were the most important dimensions of hardiness. Generally, it is not clear enough yet whether the overall score of hardiness better predicts different outcomes than the scores of its

three components, as well as which dimension of hardiness is a better predictor of specific outcome variables.

Except that, components of hardiness may be differentially important for the various types of stressors. For example, dimension of challenge could be more important when concerning stress related to achievement, but considerably less for some other types of stressors such as e.g. the loss of the loved person. Therefore, future studies should explore in more detail the relationships between stressful events and the demands they impose upon a person with specific hardiness components.

As already noted, hardiness measures are primarily developed for measuring adaptive characteristics in male employees and, therefore, they could be less adequate for females. The unidimensional factor structure of 12-items DRS scale obtained in our study shows that the measurement structure of DRS was relatively invariant across gender. Specifically, there was no significant departure from measurement invariance in terms of factor loadings, but there was significant departure in terms of error variance. Invariance in error variances is known to be a highly constrained model and may not often hold in practice (Cunningham, 1991). The results obtained in our study show that 12-items hardiness measure has the same meaning for women and men, i.e. measures the same trait on male and female samples.

Additional information about the construct validity of 12-items hardiness scale can be drawn from its associations with five-factor personality traits. This scale had the highest positive relations to extraversion and openness and negative to neuroticism, while the lowest to agreeableness, the results consistent with a recent meta-analytic study (Eschleman et al., 2010). The results of multidimensional scaling showed that hardiness is primarily related to positive affectivity and plasticity or beta factor, usually interpreted as a general approach tendency (Larsen & Augustine, 2008).

Therefore, it could be concluded that hardiness is positively related to those dispositions that buffer against the effects of stressors and negatively to dispositions that exacerbate the effects of stressors. Also, the extent of these relationships suggests that hardiness measures used in the present study could not be subsumed under the five-factor personality traits because they moderately overlap. The results showing that hardiness can predict different mental health outcomes after controlling for the effects of five-factor personality traits, additionally suggest the importance of hardiness as a construct as well as its uniqueness. Namely, our results show that while controlling for five-factor personality traits, abridged hardiness scale explained a unique variance of positive affect, negative affect and physical symptoms. Hardiness was the strongest predictor of positive affect, which is not unexpected because it might be considered as a component of general approach tendency. As already mentioned, although there are arguments that measures of hardiness are reversed measures of neuroticism (e.g. Wiebe &

Williams, 1992), and evidence that the relationships between hardiness and physical symptoms become insignificant when the effects of neuroticism are controlled for (e.g. Rhodewalt & Zone, 1989), the results of this study showed that hardiness has small but statistically significant incremental effects on negative affect and physical symptoms after controlling for personality traits including neuroticism, known to be the best predictor of these criteria. Generally, our results demonstrate the utility of hardiness in predicting mental health outcomes over personality variables examined.

It seems that a more detailed examination of the relationship between hardiness and neuroticism may be a better strategy than controlling for the effects of neuroticism. Namely, if the effect of neuroticism was systematically partialled out, it would not be possible to answer some important questions such as which neuroticism facets mostly overlap with hardiness, does neuroticism mediate the effects of hardiness on outcomes or vice versa, are there moderating effects of neuroticism and hardiness, are emotional stability and hardiness components of some higher-order dimension that has protective function against negative effect of stress, etc. Therefore, it could be concluded that future advances in the research of health consequences of hardiness are narrowly related to the advances in its conceptualizations and operationalizations.

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