

RESEARCH IN HARDINESS OF SECURITY GUARDS WITH IMPLICIT ASSOCIATION TEST AND SELF-EVALUATION PROCEDURES

Irina Plotka, Jelena Shaplavska, Nina Blumenau, Tatjana Gajevska
Baltic Psychology and Management University College
irinaplotka@inbox.lv, lena.sapl@inbox.lv, nina.blum@gmail.com

Abstract. The research is aimed at further development of experimental procedures of the implicit association test (IAT), which allow studying of hardiness and its components. The aim is to study hardiness with the implicit association test (IAT) and self-assessment procedures among security guards of medical institutions. Research questions were directed to congruency of measurement results using the IAT and explicit method by P. Bartone. Participants: 75 security guards of medical institutions, 61 men and 14 women, age 22-64 years, Mdn = 45 years. Implicit method: Four experimental procedures of the IAT on the basis of two-categories were developed (IAT1 – Commitment, IAT2 – Control, IAT3 – Challenge, IAT4 – Hardiness). Explicit methods: “Dispositional Resilience Scale, DRS-15” (P. Bartone), Strategic Approach to the Coping Scale (Hobfoll), adapted by Vodopjanova. Partial congruency of measurement results using IAT and explicit methodology by P. Bartone was found. Positive and negative implicit preferences for variables Hardiness, Control, Commitment and Challenge were revealed. The greatest number of negative preferences found in Challenge. The regression equation for the dependent variable Hardiness contains predictors Control and Commitment, measured by the IAT. There is a difference in the relationship between coping strategies and implicitly and explicitly measured hardiness and its components. The results of this research open up new possibilities in working with personnel for occupations associated with risk.

Keywords: hardiness, resilience, strategies of coping behavior, explicit and implicit measures.

Introduction

Professional activities of security guards – a profession associated with risk – involve constant presence and overcoming stressful situations that require professionally important qualities such as hardiness. Hardiness as personal characteristics, acts as a personal resource, increases adaptive capacity, and also affects the choice of effective coping strategies in difficult life situations.

Hardiness is regarded as a pattern of attitudes, skills, and abilities which constitutes courage [1], the ability not to lose health and self-possession under pressure of stressful situations [2], as a way for the formation of psychological stability [3-5]. Hardiness includes three main components: commitment, control, and challenge [1].

The theoretical bases for the research of hardiness were the research works of European and American scientists [6-8]. Empirical studies have shown that hardiness acts as a regulatory factor or buffer for stress and has a significant impact on the effectiveness of professional activity, impacts on the coping resources in stressful situations through the use of coping strategies which are focused on problem solving [7; 9-11].

The analysis of the research results has shown that this construct is researched mainly by explicit measurements. In recent years, the implicit measurements are used in researches of various psychological phenomena, but there is still a shortage of researches of hardiness using implicit measures. Implicit measurements are defined as unconscious, automatic and indirect, and explicit measurements are defined as conscious, controlled and direct [12].

Implicit association test (IAT) is an implicit attitude measure in which participants perform a series of categorization tasks on computer for a set of words representing an attitude object (e.g., words such as ant, fly, and grasshopper representing the attitude objects of insects) and for a second set of intermixed words, selected to be highly evaluative in nature. In one phase of the test, the computer response key used to indicate membership in the specified category is the same as that used to indicate a positive word. In a different phase, the key used to indicate membership in the specified category is the same as that used to indicate a negative word. If attitudes are positive, judging the target words should be faster when the same response key is used for category membership and positive words than when the same response key is used for category membership and negative words. Negative attitudes produce the opposite pattern [13].

The problem of congruency of explicit and implicit measures is one of the main problems in implicit social cognition. In implicit social cognition the definition of attitude is understood as a

mental link between the subject of attitude and its final evaluations (attributes) which are stored in memory. Recent advances in implicit social cognition suggest that implicit attitudes predict not only spontaneous but controlled behaviour [14].

The issue of congruency of implicit and explicit measures is very complex and is seen differently in the frames of different approaches. Some researchers consider that the low correlation between the implicit and explicit indicators of the same parameter should be viewed as evidence of the validity of implicit construct [15]; others connect it with the necessity to account the variables that affect on the congruency of measurements. Numerous empirical studies conducted in recent years pointed out on controversial judgments on the understanding of the correlation between implicit and explicit measures of the same psychological construct. Latvian scientists [11; 16] have developed experimental procedures of the IAT to measure hardiness and its components (commitment, control, challenge). Implicit methods are based on the measurement of the reaction time of participants when they perform a variety of tasks and their attention is focused on performing these tasks rather than on the subject of attitude. The analysis of previous researches of hardiness conducted by authors using the IAT found different results depending on the specifics of occupations related to risk. The obtained differences were the impetus for future series of experimental researches, the results of which will contribute to the creation of a model of hardiness.

The aim of this paper is to research in hardiness with the implicit association test and self-assessment procedures among security guards of medical institutions.

Research questions:

1. Is there congruence of measurement results of hardiness and its components obtained with experimental procedures of the IAT and the explicit method by P. Bartone, DRS-15?
2. What are the features of the contribution of the components Control, Commitment and Challenge in Hardiness measured with the IAT among security guards of medical institutions?
3. Is there a difference in the nature of the relationship between coping strategies and hardiness and its components measured with the self-assessment procedure by P. Bartone, as well as between coping strategies and hardiness and its components measured with the IAT?

Materials and methods

Participants: 75 security guards of medical institutions, 61 men and 14 women, age 22-64 years, *Mdn* = 45 years.

Implicit method. Four experimental procedures of the IAT, on the basis of two-categories IAT [17] were developed (IAT1 – Commitment, IAT2 – Control, IAT3 - Challenge, IAT4 – Hardiness). For each procedure the appropriate categories and attributes were identified [11; 16]. For correct selection of categories for measuring hardiness the authors relied on the theoretical approaches of S.Maddi [1] and P.Bartone [7], and also the content of the method “Dispositional Resilience Scale, DRS-15” by P.Bartone were taken into consideration [18].

The categories: “Commitment” (engagement, meaningfulness, inclusion, richness of life, interest) is preferred over “Non-Commitment” (isolation, detachment, meaninglessness, monotony of life, boredom); IAT-2: “Control” (act, overcome, control, influence, determine) is preferred over “Non-Control” (wait, give in, surrender, go with the flow, depend on); IAT-3: “Challenge” (dynamism, change, risk, uncertainty, search) is preferred over “Non-Challenge” (stability, consistency, reliability, security, banality); IAT-4: “Hardiness” (meaningfulness, overcoming, risk, resilience, vigor) is preferred over “Non-Hardiness” (meaninglessness, lack of initiative, safety, passivity, avoidance of combat). The attributes - the words with a strong affective meaning (positive or negative) were used [19].

Explicit methods. “Dispositional Resilience Scale, DRS-15” consists of 15 items, including 3 subscales (commitment, control, and challenge) of 5 statements each. The subscale of commitment determines how active the person is committed to life (as opposed to non-commitment) allows a person to feel important and valuable enough to be fully included in the decision of life tasks, despite the presence of stressful situations. The control determines the extent to which a person can influence on what is happening (as opposed to a sense of powerlessness). The challenge defines openness and sensitivity to changes in your life that are seen as opportunities for personal growth (as opposed to fear

of changes). Overall hardiness was determined by the sum of the three subscales of the questionnaire - commitment, control, and challenge.

Strategic Approach to the Coping Scale (SACS, Hobfoll), Russian version adapted by Vodopjanova, 2009 [20]. It contains 9 scales of coping behavior: assertive action, avoidance, seeking social support, cautious actions, social joining, aggressive actions, antisocial actions, impulsive actions and indirect actions. The research allowed us to reveal the participants' preferred coping strategies in times of stress.

Apparatus: Certified licensed software E-Prime 2[®].

Procedure of the research. Each participant of the experimental study passed through four versions of the experimental procedure of the IAT. Before the start of the experiment, on a computer monitor a participant was given general instructions and specific instructions before each of the seven blocks (tasks). Performance of the four versions of the implicit method took an average of 45 to 90 minutes. To ensure the internal validity of the experiment the main parameters were unchanged (the time of stimulus presentation, the intervals between stimuli, the number of stimuli - the words, the font, chromatic background settings). The task of the participants was differentiation of the presented verbal stimuli. Stimulus word was displayed on the screen without auditory accompaniment and remained on the screen until the response (pressing a key) of the participant. The reaction time for each trail was recorded as the time interval between the onset of stimulus presentation and pressing the correct key. The order of stimulus presentation was given at random.

To calculate the effect of implicit preferences of associations connected with hardiness and its components we used *D*-statistic. A comprehensive analysis of various scoring algorithms, based on hundreds of thousands participants, resulted in recommending the *D*-statistic [15]. The *D*-statistic is an effect size, "personalized" (i.e., based on each person's variance in response latencies). The *D*-statistic has several advantages, including: reducing the effect of task order in the IAT; reducing practice effects when people perform multiple IATs; maximizing the correlation between the IAT and explicit measures; it reduces unwanted variance ("noise") based on individual differences in RT and cognitive skills [21]. The *D*-statistics values of 0.15, 0.35 and 0.60 correspond to small, medium and large effect size, respectively [20; 21:32]. Similarly – in the direction of negative *D*'s. If $|D| \leq 0.15$ – no effect, if $0.15 < |D| \leq 0.35$ – small effect size, if $0.35 < |D| < 0.60$ – medium effect size, if $|D| \geq 0.60$ – large effect size.

Results and Discussion

The answer to the first research question. Research of congruence of measurement results of hardiness and its components obtained with experimental procedures of the IAT and explicit methodology by Barton was performed using the Spearman and Pearson correlation coefficients, as well as by calculating the percent of matching results obtained with the IAT and the method by P.Bartone. The relationship is not monotonic. Therefore, its research was conducted at areas with varying severity of explicit and implicit effects. The results of the measurements *X*, obtained by the method of P. Bartone, were divided by quartiles Q_1 and Q_3 into levels: $X \leq Q_1$ – low, $Q_1 < X < Q_3$ – middle, $X \geq Q_3$ – high. The results of the measurements *D*, obtained with the IAT, were divided into groups according to [22].

The results showed compliance of implicit and explicit measurements of the researched constructs evaluated by the correlation coefficients, the values of which fall within the valid range from 0.12 to 0.72 [21]. The Spearman's correlation coefficients are shown in Table 1.

Table 1

Spearman's correlation coefficients dependent on Hardiness (Bartone) level

Variables		Hardiness (Bartone)		
		low	middle	high
<i>H(D)</i>	<i>H(B)</i>	$r(22) = 0.391$; ns	$r(28) = -0.013$; ns	$r(25) = 0.244$; ns
<i>CM(B)</i>	<i>CM(B)</i>	$r(22) = 0.0099$; ns	$r(28) = 0.0089$; ns	$r(25) = -0.316$; ns
<i>CO(D)</i>	<i>CO(B)</i>	$r(22) = 0.435$; $p \leq 0.05$	$r(28) = 0.226$; ns	$r(25) = -0.075$; ns
<i>CH(D)</i>	<i>CH(B)</i>	$r(22) = -0.011$; ns	$r(28) = -0.375$; $p \leq 0.05$	$r(25) = -0.312$; ns

Notations: *H* – Hardiness; *CM* – Commitment; *CO* – Control; *CH* – Challenge; *B* – Bartone; *D* – IAT.

In addition, we calculated the Pearson and Spearman correlation coefficients falling within the interval (0.12; 0.72), depending on the size of the effect for implicitly measured hardiness and its components. Their presentation is beyond the scope of this paper. The research of congruence of measurements with correlation coefficients suggests the complexity of matches depending on the size of effects of both implicit preferences, as well as the levels of severity of the results of explicit measurements.

To calculate the percent match frequency analysis was used. The match will be the following results: (1) D (IAT) “no effect” – Bartone “low”; (2) D (IAT) “medium positive” – Bartone “middle”; (3) D (IAT) “large positive” – Bartone “high”. Obtained percentage of matches: Hardiness – 28.0 %; Control – 36.0 %; Commitment – 33.3 %; Challenge – 16.0 %; Total – 28.3 %.

Congruence of measurements using the IAT and the explicit method by P. Bartone is quite satisfactory. It appears that the reason for discrepancy of the results of implicit and explicit measurements is connected not only with the problem of the reliability of self-assessment procedures, but also with the need to account for those variables (affective experiences, recent and past experience, cultural values) that affect the consistency of measurements. However, it is necessary to take into account the fact that automatic and controlled judgments are based on different factors and their valence may be completely different [14].

The answer to the second research question. To research the contribution of the variables Control ($D(CO)$), Commitment ($D(CM)$) and Challenge ($D(CH)$) to the variable Hardiness ($D(H)$), measured using the IAT among security guards of medical institutions the authors conducted a multiple regression analysis. Dependent variable – $D(H)$, independent variables: $D(CO)$, $D(CM)$, $D(CH)$. Methods “Forward”, “Backward” and “Stepwise” gave the same results. The equation for estimations:

$$D(H) = 0.176 + 0.331 \cdot D(CO) + 0.254 \cdot D(CM). \quad (1)$$

Statistical significance of constant is $p \leq 0.05$. Statistical significance of B-coefficients: $b_1 = 0.331$, $p \leq 0.001$ (variable $D(CO)$); $b_2 = 0.254$, $p \leq 0.01$ (variable $D(CM)$). The variable $D(CH)$ was not included in the regression equation. Standard errors: $SE(Const.) = 0.067$; $SE(b_1) = 0.080$; $SE(b_2) = 0.086$. Standardized regression equation:

$$(D(H))_z = 0.414 \cdot (D(CO))_z + 0.295 \cdot (D(CM))_z. \quad (2)$$

From the equation (2) it follows that the greatest impact on $D(H)$ according to the IAT is made by the variable $D(CO)$ ($\beta_1 = 0.414$, $p \leq 0.001$), and $D(CM)$ ($\beta_2 = 0.295$, $p \leq 0.01$).

R-Square = 0.319 shows, that 31.9 % of variability of the dependent variable $D(H)$ is due to the influence of the independent variables $D(CO)$ and $D(CM)$. Adjusted R-square = 0.300. Standard error of estimate 0.31903. The result of ANOVA is: $F(2,72) = 16.850$; $p \leq 0.001$.

A characteristic feature of the security guards at medical institutions was the presence of a large number of negative preferences (32 %) for the variable Challenge (Fig. 1) measured using the IAT. The research conducted by a team of authors led by prof. I. Plotka, using the IAT showed the presence of negative implicit preferences for salaried militaries by the variable Commitment, for soccer players – by Control, for truck drivers – by Challenge. The presence of this trend in occupations associated with risk requires further consideration.

The answer to the third research question. The relationship between coping strategies (assertive actions, avoidance, seeking social support, cautious actions, social joining, aggressive actions, antisocial actions, impulsive actions and indirect actions) and hardiness and its components measured with the self-assessment procedure by P. Bartone and using the IAT was researched using the Spearman correlation coefficient. The results of the research are shown in Fig. 2. The implicitly measured variable Challenge is positively associated with aggressive actions, and explicitly measured Challenge is negatively associated with impulsive actions. These relationships are consistent with the presence of negative implicit preference for the variable Challenge. This result is evidence in favor of the validity of measurements using the experimental procedure IAT.

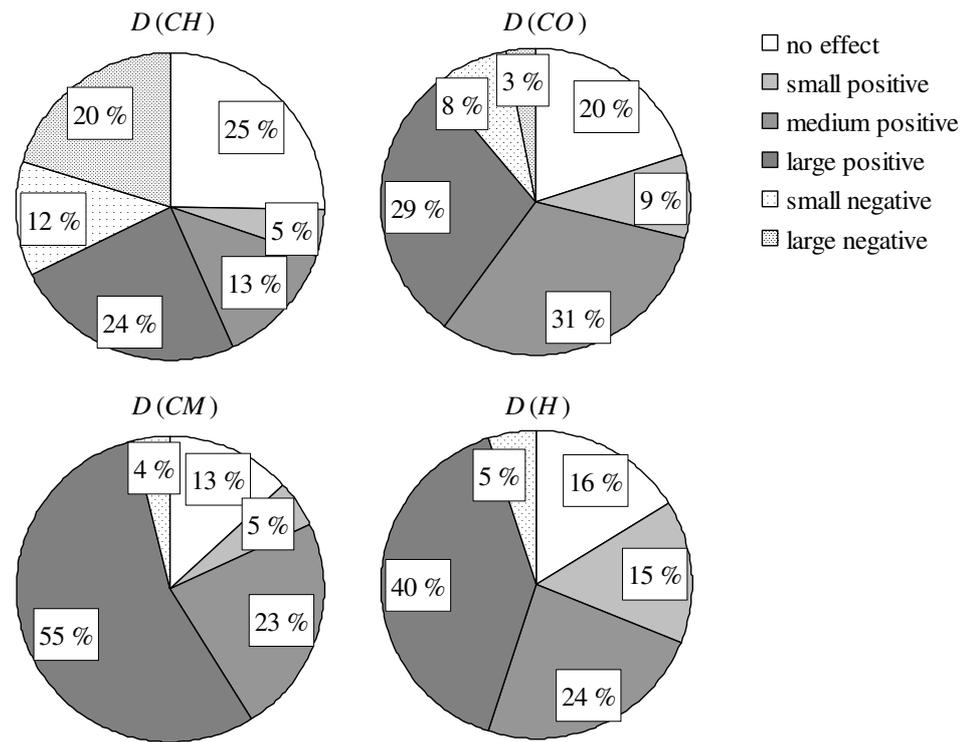


Fig. 1. Percentages of sizes of preference effect for Hardiness ($D(H)$) and its components: Challenge ($D(CH)$), Commitment ($D(CM)$), Control ($D(CO)$), measured with IAT

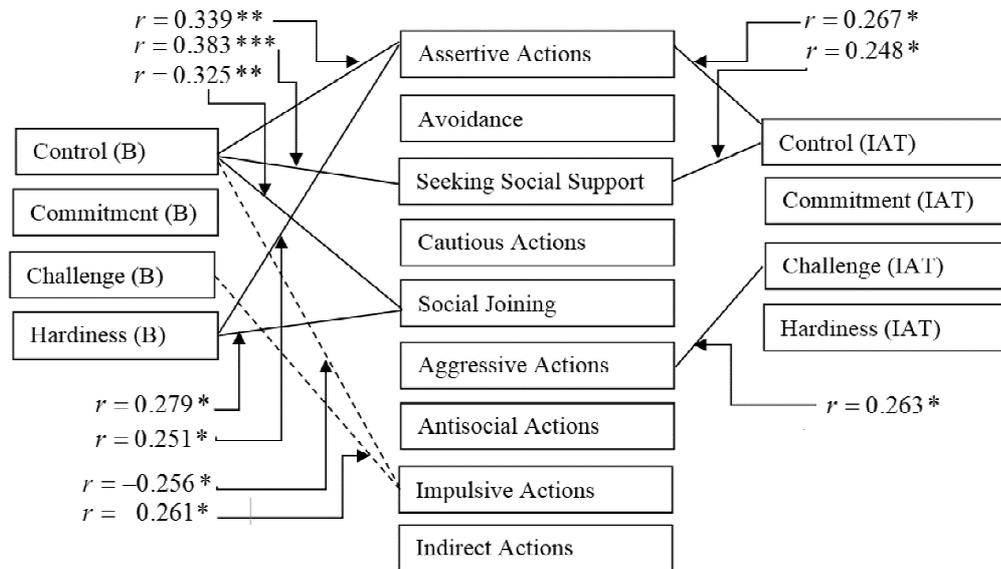


Fig. 2. Relationship between coping strategies and hardiness and its components measured with the IAT and by P. Bartone: the statistical significance of Spearman correlation coefficients is indicated by asterisks:*, **, *** correlation is significant at the 0.05 level (2-tailed), at the 0.01 level (2-tailed), *** at the 0.001 level (2-tailed) accordingly

The implicitly measured variable Control as well as the corresponding explicit variable Control, are positively associated with coping strategies – assertive actions and the search for social support, which also speaks about the validity of measurements using the experimental procedure IAT.

The rest of the relationships between the scales of the explicit methods by P. Bartone and Hobfoll (Fig. 2) confirm the previously established regularity [e.g., 7; 9-11]. Similar relationships between the implicitly measured hardiness, control, challenge, commitment and coping strategies were not found.

Conclusions

1. As a result of the research its aim was implemented and the main results are presented. The main provisions of the methodology of implicit social cognition give reason to believe that the measurements with the use of implicit and explicit measurement provide not only additional information on correspondence between the measurements carried out with the use of both methods but also provide a new understanding of the researched construct (hardiness).
2. Experimental procedures of the IAT allow us to measure the effect of hidden, implicit preferences of verbal stimuli (that characterize the parameters of behavior defined by personality traits, its intentional and motivational characteristics that reflect the content of the construct of hardiness and its components) and attributes that have a positive or negative valence.
3. Developed by the authors four experimental procedures of the IAT on the basis of the two-categories IAT were used to research hardiness, commitment, control and challenge among security guards of medical institutions. Both positive and negative implicit preferences for all variables were found. The greatest number of negative preferences was found for the variable Challenge.
4. The relationship of the measurements of hardiness and its components, obtained with experimental procedures IAT and the explicit method by P. Bartone is not monotonic. It depends on the severity of explicit and implicit effects. For some effect sizes the authors found correlation coefficients falling within the permissible range of the correlation coefficients between implicit and explicit measurements (0.12; 0.72). The highest percentage of matches is 36.0 % (Control), the lowest – 16.0 % (Challenge). Congruence of measurements using the IAT and explicit method by P. Bartone is quite satisfactory. The reason for discrepancy of the results of implicit and explicit measurements is connected not only with the problem of the reliability of self-assessment procedures, but also with the need to account for those variables. The automatic and controlled judgments are based on different factors and their valence may be completely different.
5. The linear multiple regression equation with the variables measured with experimental procedures IAT with the dependent variable Hardiness contains only two independent variables: Control and Commitment. The variable Control has the greatest influence on Hardiness, the variable Commitment – the smallest. 31.9 % of variability of the dependent variable Hardiness is explained by the influence of these two variables. The variable Challenge was not included in the equation.
6. A positive relationship between the implicitly measured variable Challenge and the coping strategy “aggressive actions” was revealed. The authors found the negative relationship between the explicitly measured by Barton variable Challenge and the coping strategy “impulsive actions”. These results are consistent with the presence of negative implicit preference for the variable Challenge and are the evidence in favor of the validity of measurements using the experimental procedure IAT.
7. The implicitly measured variable Control as well as the explicit variable Control is positively associated with coping strategies “assertive actions” and “search for social support”, indicating the validity of the measurements using the experimental procedure IAT.
8. It is shown that the rest found relationships Control (Bartone) – social joining, impulsive actions; Hardiness (Bartone) – assertive actions, social joining, between the scales of the explicit methods by P. Bartone and Hobfoll confirm the previously established regularity. Similar relationships between implicitly measured hardiness, control, challenge, commitment and coping strategies were not revealed.
9. The results of this research open up new possibilities in working with personnel for occupations associated with risk.

References

1. Maddi S. R. Hardiness: Turning Stressful Circumstances into Resilient Growth. Springer Briefs in Psychology, 2013. XI, 88 p.
2. Bartone P.T., Roland R.R., Picano J.J., Williams T.J. Psychological hardiness predicts success in US Army Special Forces candidates. International Journal of Selection and Assessment, vol. 16(1), 2008, pp. 78-81.

3. Bartone P.T. Resilience Under Military Operational Stress: Can Leaders Influence Hardiness? *Military Psychology*, vol. 18, 2006, pp. 131-148.
4. Bonanno G.A. Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events. *American Psychologist*, vol. 59(1), 2004, pp. 20-28.
5. Maddi S. R. On hardiness and other pathways to resilience. *American Psychologist*, vol. 60(3), 2005, pp.261-262.
6. Maddi S., Khoshaba D.M. *Resilience at Work*. New York: American Management Association, 2005. 219 p.
7. Bartone P.T., Kelly D.R., Matthews M.D. Psychological hardiness predicts adaptability in military leaders: A prospective study. *International Journal of Selection and Assessment*, vol. 21(2), 2013, pp. 200-210.
8. Britt T.W., Adler A.B., Bartone P.T. Deriving benefits from stressful events: The role of engagement in meaningful work and hardiness. *Journal of Occupational Health Psychology*, 2001, vol. 6(1), pp. 53-63.
9. Delahaija R., Gaillard A.W.K., van Damb K. Hardiness and the response to stressful situations: Investigating mediating processes. *Personality and Individual Differences*, vol. 5, 2010, pp. 386-390.
10. Sandvik A.M., Bartone P.T., Hystad S.W. etc. Psychological hardiness predicts neuro-immunological responses to stress. *Psychology, Health & Medicine*, vol. 18, 2013, pp. 705-713.
11. Shaplavska J., Plotka I. Research of Hardiness using explicit and implicit measures (on the basis of professions related to risk). *International Business: Innovations, Psychology, Economics*, vol. 5(1), 2014, pp. 27-41.
12. Petty R.E., Fazio R.H., Brinol P. *Attitudes: Insights from the New Implicit Measures*. New York: Psychology Press, 2009. 544 p.
13. *APA Concise Dictionary of Psychology*. Washington, DC: American Psychological Association, 2009, 583 p.
14. Rudman L.A. Sources of Implicit Attitudes. *Current Direction in Psychological Science*, vol. 13(2), 2013, pp. 79-82.
15. Greenwald A.G., Nosek B.A., Banaji M.R. Understanding and Using the Implicit Association Test: I. An Improved Scoring Algorithm. *Journal of Personality and Social Psychology*, vol. 85, 2003, pp. 197-216.
16. Plotka I., Blumenau N., Igonin D., Simane L., Bambulaka M., Shaplavska J. Implicit measurements of attitudes: Innovative approach to training and education of students. *Proceedings of 4th International Scientific Conference "Innovative potential of Educational space subjects in the conditions of Educational Modernization"*, October 21-22, 2013, Rostov-on-Don, Russia, pp. 127-131.
17. Greenwald A.G., McGhee D.E., Schwartz J.K.L. Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology*, vol. 74, 1998, pp. 1464-1480.
18. Bartone P.T., Eid J., Hystad S.W., Johnsen B.H., Laberg, J.C. Norwegian adaptation of the DRS - Dispositional Resilience Scale for measuring hardiness under stress. *Scandinavian Journal of Psychology*, vol. 51(3), 2008, pp. 237-245.
19. Schlossberg H. Three dimensions of emotion. *Psychology Review*, vol. 61, 1954, pp. 81-88.
20. Водопьянова Н.Е. Психодиагностика стресса (*Psychodiagnosics Stress*). СПб.: Питер. 2009, 336 p.; [pp. 251-259]. (In Russian)
21. Cai H., Sriram N., Greenwald A. G., McFarland S. G. The Implicit Association Test's D measure can minimize a cognitive skill confound: Comment on McFarland and Crouch (2002). *Social Cognition*, vol. 22, 2004, pp. 673-684.
22. Rudman L.A. *Implicit Measures for Social and Personality Psychology*. Rutgers University, USA: SAGE Publications Ltd, 2011. 96 p.