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Retirement Resources Inventory—Scale Assessment, Relationship to Retirement Satisfaction, Adjustment and a Meta-Analytical Review

R. Hanák[a, b, *] and L. Pitel[b, c]

[a] *Department of Information Management, Faculty of Business Management, University of Economics in Bratislava, Bratislava, 85235 Slovakia*

[b] *Institute of Experimental Psychology, Centre of Social and Psychological Sciences, Slovak Academy of Sciences, Bratislava, 84104 Slovakia*

[c] *Hull York Medical School, University of Hull, Allam Medical Building, Kingston upon Hull, Heslington, HU67RX United Kingdom*

**e-mail: robohanak@gmail.com*

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Abstract—The Retirement Resources Inventory (RRI) created by C.S. Leung and L.K. Earl is a frequently used self-reported scale for measuring retirement resources. Since it was introduced, 10 scientific papers have been published using the full set of questions and 3 papers using only some of the questions. These have produced ambiguous and inconsistent results with considerable differences in almost all the parameters measured between countries. This paper aims to conduct a systematic review of the scale's psychometric characteristics and examine the meta-analytic relationship to retirement adjustment, satisfaction and validation for the Slovak population. Instead of the proposed 6-factor structure, we found that different scholars had identified from 3 to 10 factors, and using a Slovak sample we found 4 factors. Internal reliability measured by Cronbach's alpha showed high levels in all the studies (0.85–0.93). Meta-analytical relationships with RAI showed a strong random effect, $r = 0.6$ CI [0.35, 0.85], with the RSI, $r = 0.509$ CI [0.46, 0.56]. But the mean score for the specific subscales differed significantly from the original study in each of the countries it was tested in. Before the RRI is used to measure retirement resources, it should be validated on large samples and adjusted to national specifications to confirm/reject it as a psychometrically valid measure.

Keywords: retirement resources inventory, RRI, retirement adjustment, retirement satisfaction, validation

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INTRODUCTION

Retirement is a milestone in a person's life with significant life consequences [4, 13, 15, 21]. Retirement entails some positive and many negative consequences, such as partial or substantial loss of financial income, social contacts and health issues [6, 11, 19]. These retirement symptoms negatively affect retirement adjustment and satisfaction. Scientific research has been conducted to explore individual differences in retirement adjustment and satisfaction [17]. One line of research considers the relationship between various types of resources accumulated before retirement and subsequent adjustment and satisfaction after retirement [5, 12]. The research is based on the model of the conservation of resources accumulated by the individual [7–9], which states that resources create a buffer and provide protection in stressful situations. Hobfoll's model of resources was extended and adjusted for the retirement domain theory by M. Wang [15] and consequently [16] created a model of the dynamic resource-based process. They theoretically organized the resources into six relatively independent categories: physical, cognitive, motivational, financial, social and emotional [16]. To empirically measure individual retirement resources, C.S. Leung et al. [12] subsequently created a self-reported inventory based on M. Wang et al.'s [16] model. They named it the Retirement Resources Inventory (RRI). For each resource category, they elaborated several question items to measure the status of the resources. Since it was introduced in 2012, we have been able to identify three published papers using part of the inventory and 10 published papers using the full inventory. As one of the studies [2], probably overlaps with another study [1] in terms of the sample (respondents), we used the data from the older study. Although 13 papers were published, only the paper by [1] attempted to systematically validate the RRI on a sufficiently large sample ($n = 1002$); all the other studies plus primary one [12] used much smaller samples. Originally, M. Wang [15] proposed six factors for the theoretical resource model, but [12] applied an exploratory factor analysis and identified only three factors in a sample of 267 Australian retirees. To solve this discrepancy,

C.S. Leung et al. [12] merged different resources groups together, specifically the emotional, cognitive and motivational resources were placed in a set of resources labeled RT1, whereas the second group (RT2) contained social resources only and the last group (RT3) consisted of the physical and financial resources combined. Other authors [21] found very similar results in their confirmatory factor analysis, which indicated that the 3-factor model had better parameters than both the 6-factor model and the factor model based on a sample of 197 working Chinese adults. D.E.S. Fadila et al. [3] accepted these three factors when using the RRI on 210 Egyptian retirees but they did not report whether they had applied a factor analysis to their own data. The authors of the present study identified four factors in a Slovak sample of 237 Slovak retirees (see the sections below). D.W. Walsh [14] obtained different results in his dissertation on a sample of 248 US retirees, identifying 10 factors. That study identified financial and emotional resources, but the other factors were not loaded consistently. The most comprehensive research validating the RRI was performed by [1] who had a sample of 1002 Brazilian retirees. They identified five factors: physical, financial, social and emotional resources as separate factors, and cognitive and motivational resources were merged into one factor. Only three papers [1, 12, 14] and this paper have reported specific factor loadings for each RRI question/item, which allowed us to make a cross-country comparison of all 35 items from the RRI. We found that some items had very different loadings in different countries and, in many cases, these were even assigned to different factors. The result is an incoherent picture, which we speculate may be at least partially attributed to national, cultural, macro-economic and legal differences in the RRI in different countries. The level of perceived physical, cognitive, mental and financial retirement resources may be highly influenced by these factors. Social and emotional resources reflect national culture, traditions and worldview. Therefore, we expect that these resources depend on the country situation as well. One can expect the RRI to be highly country-specific, generating different scores for the subscales and different total score results in each of the countries it is used in. Based on these assumptions we set our two hypotheses as follows:

H1: *Mean total RRI score differs significantly in each country it is used in from the RRI mean score in Australia*.

The total score is the sum of all the subscales, but we expect the difference is present in each subscale. Therefore, we set hypothesis two as follows:

H2: *Mean total score of RRI subscales differs significantly in each country it is used in compared to the mean score obtained in Australia*.

In addition our study has several partial aims: (a) to investigate the country and culture by comparing total and specific mean RRI scores with the original study; (b) to apply a meta-analysis to investigate the relationship between retirement resources (measured by the RRI) and retirement adjustment and satisfaction; (c) to investigate the internal structure and psychometric characteristics of the RRI on the Slovak population.

MATERIALS AND METHODS

Sample and Procedure

The first wave of data was collected online in Slovakia in November 2018 by a market research agency from its participant database. The final sample consisted of 237 participants (M 67.17 years; SD 4.39 years; 50.21% men). A small financial incentive was given for participation. The inclusion criteria were that participants had to be at least 60 years old and be retired, having reached the legal retirement age for at least two years (apart from any minor occasional paid work). Three months later, in February 2019, a retest was conducted. Of the 250 original participants, 209 took part in the retest, and 198 of them were eligible for inclusion in the final analyses (M 67.54 years; SD 4.32 years; 49.49% men). Informed consent was obtained from all participants prior to the data collection.

For the meta-analytical investigation of the RRI, we collected all the studies citing the original [12] study and searched for numerical values of: (a) the relationship between the RRI and RSI or retirement adjustment, (b) the mean scores of the RRI and its subscales.

Measures

The *sociodemographic variables* were age (in years), sex, relationship status, education, current income from pension rent and other state benefits (as a categorical variable with eight categories), time since start of retirement (in years and months), current work (if any), time in paid work since retirement (including only minor jobs; in years and months), and number of children.

Retirement adjustment was measured by a 13-item measure adapted from the Healthy Retirement Project [18]. Each item had five response options on a Likert scale from 'strongly disagree' to 'strongly agree.'

Retirement satisfaction was measured by the Retirement Satisfaction Inventory [4]. Just like in the Australian RRI validation study [12], we used ten items from the 'satisfaction with life in retirement' section. Each item had six response options on a Likert scale, ranging from 'very unsatisfied' to 'very satisfied,' plus a 'does not apply to me' option, which we treated as 'missing' in the analysis.

Retirement resources were measured using the Slovak translation of the *Retirement Resources Inventory*. The RRI was translated by a Slovak person with English language skills close to those of an English

Table 1. Model fit measures for the three different models

Number of factors	RMSEA 90% CI					Model test		
	RMSEA	lower	upper	TLI	BIC	χ^2	*df*	*p*
4	0.07	0.07	0.08	0.69	−1501.63	1019.15	461	<0.001
3	0.08	0.07	0.09	0.62	−1468.62	1227.13	493	<0.001
6	0.06	0.05	0.06	0.80	−1471.23	715.99	400	<0.001

native speaker, and subsequently back-translated by a person with a similar level of English proficiency.

RESULTS AND DISCUSSION

We have organized the results into the following sections. We start with the psychometric characteristics of the RRI for the Slovak population. Cronbach's alpha was used to measure reliability and was reported in all the published studies. Values range from 0.85 for the results in this study to 0.93 [21]. Apart from in this study $r = 0.78$ (Table 3) test-retest reliability was performed only in the original study, $r = 0.83$ [12] and in [6], $r = 0.88$. Secondly, we report the results for the factor structure of the RRI inventory. The RRI has only recently been introduced in Slovakia and almost all scientists investigating the psychometric characteristics of this questionnaire have found different numbers of factors so we decided to perform an exploratory factor analysis, using the maximum likelihood method. As we expected correlation between factors, we opted for the Varimax rotation. Applying these methods to our data we found four factors where the percentage of total variance explained was 34.22. To verify the theoretical background of the six factors proposed by [16] and the three factors found by [12], we also conducted an exploratory factor analysis with forced three and six factors (Table 1). For the three factors Bartlett's Test of Sphericity was X (595) = 2967.13; $p < 0.001$ and Kaiser–Mayer–Olkin Measure of Sampling Adequacy was 0.78. All the models (3-, 4- and 6-factor) have a highly significant Chi-square (see Table 1), which indicates that some items in the model correlate with different factors both freely and in parallel, without systematic loading on one of the factors. Table 2 reports the specific item factor loading. Comparing the statistical characteristics of these three models, we can see that lowest root mean square error of approximation (RMSEA) is 0.06, which is the recommended limit value. The Tucker–Lewis index (TLI) is at values 0.8 or lower, which is much lower than the recommended threshold of 0.95 [10]. The results in the three factor model are more or less similar to the model produced by [12], whereas the six factor model loading matrix shows a very high random correlation between items and identified factors.

The more problematic results can be found in the Factor Loading Matrix (see Table 2). In the factor loading matrix, we can identify three items (4, 20, 21) that correlate with two factors with loadings higher than 0.3 and two items (3, 15) that do not correlate (higher than 0.3) with any of the identified factors. Another problem is that in our results, many of the factor loadings for items differ from those reported by [12] and other authors. In the last column of Table 2, we report the communalities (M = 0.66), labeled as Uniqueness.

Relationship between RRI and RSI and Retirement Adjustment and the Meta-Analysis

The meta-analytical results indicate that the random effect for the relationship between the RRI and the Retirement Satisfaction Inventory (RSI) is $r = 0.67$ CI [0.26–1.08], $k = 5$, $n = 787$ with small heterogeneity $\tau^2 = 0.32$ CI [0.12–0.85]. The studies included were [14], the original study [3, 12] and the present study (see Table 3). The meta-analytical results indicate that the random effect for the relationship between RRI and Retirement Adjustment with small heterogeneity, $\tau^2 = 0.065$, SE = 0.055 and with robust Fail-Safe results is $n = 405$ studies.

National and Cultural Differences in RRI

Comparing [20] versus [13] using *t*-test regarding the mean score of resources for the specific subscales (physical, financial, social, emotional, cognitive), we found significant differences (Table 4) in all subscales except the motivational one and they were close to the *p*-value threshold of 0.05 ($t = -1.88$; $p = 0.06$). These results supports hypotheses H1 and H2.

Psychometric Characteristics of the RRI

Cronbach's alpha, which was used to measure internal consistency reliability in all the studies showed very good results, including in the present study. The literature review in the introduction to the empirical studies reporting factor analyses shows that the weakness in the RRI is its internal factor structure. Our exploratory factor analysis revealed four factors, whereas some studies have found three factors [12, 21], and others five [1], six [13], or even 10 factors [14]. In terms of structure design, a possible future revision of the RRI could benefit from procedures such as item response theory or test theory. The variability could be

Table 2. Factor loadings, 'Maximum likelihood' extraction method combined with a 'varimax' rotation

	Factor				Uniqueness
	1	2	3	4	
Perceived health (RRI01)	0.10	0.03	**0.91**	0.04	0.16
Physical illnesses (RRI02r)	0.05	–0.01	**0.77**	0.04	0.40
Mental disorders (RRI03r)	0.18	0.15	0.20	0.05	0.90
Energy level (RRI04)	**0.34**	0.07	**0.55**	0.10	0.57
Income adequacy (RRI05)	0.10	0.12	0.23	**0.61**	0.56
Financial support from own savings (RRI06)	0.03	0.00	0.12	**0.99**	0.00
Financial support from investments (RRI07)	0.01	–0.02	–0.03	**0.46**	0.79
Financial support from superannuation (RRI08)	–0.02	0.14	–0.03	**0.32**	0.88
Friends (RRI09)	0.12	**0.59**	0.14	0.02	0.62
Family members (RRI10)	0.10	**0.51**	0.00	0.16	0.70
Acquaintances (RRI11)	–0.08	**0.61**	0.16	0.05	0.60
Supportive interaction with friends (RRI12)	0.20	**0.54**	0.11	0.03	0.65
Supportive interaction with family members (RRI13)	0.21	**0.52**	–0.01	0.02	0.69
Supportive interaction with acquaintances (RRI14)	–0.06	**0.67**	0.14	0.01	0.53
Informational support (RRI15)	–0.03	0.28	–0.01	0.01	0.92
Emotional support (RRI16)	0.14	**0.57**	–0.10	0.03	0.64
Tangible support (RRI17)	0.01	**0.44**	–0.19	–0.03	0.77
Positive emotions (RRI18)	0.24	**0.55**	0.30	0.16	0.52
Ability to perceive emotions (RRI19)	**0.45**	0.29	0.03	0.13	0.69
Knowledge about emotions (RRI20)	**0.52**	**0.31**	0.01	0.06	0.63
Ability to facilitate thoughts (RRI21)	**0.57**	**0.33**	0.07	0.05	0.55
Mastery (perceived control) (RRI22r)	**0.31**	0.06	0.12	0.08	0.88
Self-esteem (RRI23)	**0.33**	0.13	0.21	–0.04	0.83
Short term memory (RRI24r)	**0.30**	–0.09	–0.11	–0.02	0.89
Long term memory (RRI25)	**0.50**	0.04	–0.07	0.03	0.74
Semantic memory (RRI26)	**0.46**	0.03	0.06	0.05	0.78
Learning ability (RRI27)	**0.61**	0.05	0.24	–0.05	0.56
Processing speed (RRI28)	**0.66**	–0.12	0.10	0.04	0.54
Problem-solving ability (RRI29)	**0.71**	0.02	0.11	0.07	0.48
Decision making ability (RRI30)	**0.68**	0.04	0.09	–0.01	0.52
Tenacious goal pursuit 1 (RRI31)	**0.47**	0.08	0.16	–0.02	0.75
Tenacious goal pursuit 2 (RRI32)	**0.38**	0.13	0.05	–0.00	0.84
Flexible goal adjustment 1 (RRI33)	**0.31**	0.10	0.11	–0.05	0.88
Flexible goal adjustment 2 (RRI34r)	**0.53**	0.03	0.01	–0.09	0.71
Flexible goal adjustment 3 (RRI35r)	**0.37**	–0.00	–0.03	0.07	0.85
Eigenvalue	4.59	3.33	2.27	1.79	
% variance	13.11	9.51	6.48	5.12	

In bold letters are items—questions with loading higher than 0.3. Items marked with r are reversed.

down to national, cultural and macroeconomic differences in the countries the RRI was tested in. The mean total score for the RRI significantly differs from the mean total score obtained in the original research conducted in Australia in each country it has been used in. We found that this also applies to the mean score for almost all the subscales. These significant differences indicate moderators such as differences in the culture, macro-economic and legal conditions in the countries where the RRI was used. Therefore, the mean scores

Table 3. Correlation matrix of continuous study variables

	Variables	n[1]	M	SD	%[2]	1	2	3	4	5	6	7	8	9
1	Age	237	67.17	4.39	n. a.	(1)								
2	Years working part-time since retirement	27	6.49	4.50	n. a.	0.54**	(1)							
3	Years retired	237	7.46	5.05	n. a.	0.78***	0.78***	(1)						
4	Number of children	237	2.10	0.99	n. a.	0.02	0.39*	0.10	(1)					
5	Total RRI score–baseline	237	114.85	11.53	57.03	0.02	0.11	–0.08	0.20**	(1)				
6	Retirement adjustment–baseline	237	43.41	7.21	58.47	–0.21*	–0.18	–0.19**	0.10	0.43***	(1)			
7	Retirement satisfaction–baseline	122	51.47	7.00	62.93	0.04	–0.07	0.03	0.05	0.56***	0.53***	(1)		
8	Total RRI score–retest	198	116.25	12.68	58.04	0.00	0.02	–0.05	0.22**	0.78***	0.45***	0.52***	(1)	
9	Retirement adjustment–retest	198	43.73	7.55	59.10	–0.07	–0.48*	–0.09	0.13	0.40***	0.80***	0.52***	0.48***	(1)
10	Retirement satisfaction–retest	107	42.21	7.84	64.41	–0.05	–0.28	–0.05	0.13	0.53***	0.61***	0.80***	0.63***	0.66***

[1] 'n' relates to the number of participants with complete data for the variable given in each row. In the bivariate correlations, the number of participants equals the smaller n of the two correlated variables. In years working part-time since retirement correlated with retirement satisfaction baseline, RRI retest, retirement adjustment retest, and retirement satisfaction retest, n equals 11, 24, 24, and 16, respectively; in retirement satisfaction, retest correlated with the retirement satisfaction baseline, n equals 75.

[2] Values in the '%' column were calculated thus: (M–min attainable score)/(max attainable score–min attainable score).

* $p < 0.05$, two-tailed; ** $p < 0.01$, two-tailed; *** $p < 0.001$, two-tailed; n. a.—not available.

Table 4. Mean score for total RRI and subscales where reported

Study	*n*	Mean (SD) total RRI	*t* statistics, *p*-value	RT3 Mean (SD)	*t* statistics, *p*-value	RT1 Mean Mental Capacity (SD)	*t* statistics, *p*-value	RT2 Mean Social Resources (SD)	*t* statistics, *p*-value
Leung et al. [12]	267	123.84 (15.08)		27.09 (5.14)		68.03 (8.08)		28.39 (6.14)	
Walsh [14]	270	128.8 (12.39)	4.17*	n. r.		n. r.		n. r.	
Hanák and Pitel	237	114.85 (11.53)	–7.45*	21.86 (3.59)	–13.09*	64.78 (7.0)	–3.25*	28.2 (5.38)	–0.19; 0.71
Hawash et al. [6]	210	89.94 (33.53)	–14.74*	19.56 (7.66)	–12.81*	48.5 (19.13)	–15.06*	21.88 (8.97)	–9.39*
Yeung et al. [21]	197	115.85 (15.75)	–5.54*	27.36 (3.84)	0.62; 0.54	61.38 (8.64)	–8.51*	24.84 (5.31)	–6.51*
Yeung [20]	128	116.9 (14.35)	–4.35*	n. r.		n. r.		n. r.	

* $p < 0.0001$; n. r.—not reported.

obtained in one country should not be used as a basis for comparison with another country.

Relationship between the RRI and RSI and Retirement Adjustment and the Meta-Analysis

We found a relatively strong overall relationship between the RRI and the RSI and between the RRI and Retirement Adjustment across the countries investigated. But the detailed investigation of this relationship in our study shows a more complicated picture. It did not confirm the findings on the cross-lagged panel correlations from the original Australian study [12]. Contrary to our expectations, retirement adjustment at baseline was better able to predict the RRI total score at the retest than vice versa. Furthermore, the predictive ability of the RRI regarding future retirement satisfaction was of almost the same strength as the predictive ability of the retirement satisfaction measure regarding future RRI scores. Thus our evidence does not appear to support the resources theory, which holds that the predictive ability of the RRI measure regarding retirement adjustment satisfaction and retirement satisfaction should be stronger than vice versa. However, it may be that three months period was too short a time to yield a sufficient potential effect of the retirement resources on retirement adjustment and retirement satisfaction. Further

research covering longer periods of time and involving multiple phases are required to shed more light on this hypothetical causal effect.

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COMPLIANCE WITH ETHICAL STANDARDS

The authors declare that they have no conflicts of interest.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants involved in the study.

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