FACTORS UNDERLYING RELIGIOUS ORIENTATION SCALE
– A Methodological Approach –

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Abstract

This study translated the 21-item Religious Orientation Scale (ROS) into Persian and explored its factorial validity in Iran by administering it to 329 undergraduate university students and employing three methods of factor extraction, i.e., Maximum Likelihood (ML), Principal Axis Factoring (PAF) and Principal Component Analysis (PCA). Among the three methods, ML seems to be favored in the literature recently because it forms the basis of the structural equation modeling (SEM) upon which studies such as Brewczynski and MacDonald's (2006) are developed. The ML, PAF and PCA all extracted four latent variables (LVs) when they were applied to the participants' responses and the LVs were rotated via Varimax with Kaiser Normalization. When the highest loading of a cross loading item was kept and its loadings on other LVs were removed, it was found that the three methods had the same items loading on factors three and four. The one-way ANOVA analysis of the mean of loadings and post hoc tests, however, showed that the PCA differed significantly from the ML and PAF. It was also found that the first factor extracted by the PAF is the same as the second factor of the ML and vice versa. Based on the items loading on the first two factors it is suggested that the PAF be adopted as the best

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method of factor extraction in both exploratory and confirmatory studies.

Key Words: Latent variables, maximum likelihood, principal axis factoring, principal component analysis, SEM

1. Introduction

While exploring abilities such as foreign language proficiency is achieved through tests whose validity is established by employing a number of approaches such as content analysis (Khodadady, 1999), what underlies learners' attitudes, beliefs and opinions as regards language learning is identified logically and then changed into psychological scales as "the most widely used survey data collection techniques" (de Vau, 1985: 70). As a distinct example of a psychological measure, the Religious Orientation Scale (ROS) conceived by Allport (1950; 1954) and developed originally by Allport and Ross (1967) has attracted the attention of scholars in many fields to explore the relationship between religious orientation and a host of variables such as mental health (e.g., Ghorbani et al., 2000), stress (Almeida, 2006), and child-parent attachment (Miner, 2009), to mention few.

Religious orientation is logically approached as a construct consisting of two components, i.e., intrinsic and extrinsic motivations, which are assumed to help human beings pursue a religious life as an end in itself and as a means to achieve certain goals, respectively (Allport and Ross, 1967). Almeida (2006), for example, administered the ROS revised by Genia (1993) to 76 undergraduate engineering students at the University of the Witwatersrand and treated it as a measure consisting of intrinsic and extrinsic subscales. However, Almeida could not find any significant relationships between the religious orientation and stress as measured by the Pressure Inventory designed by Weiten (1988; 1992; 1998).

Similarly, Ghorbani et al. (2000) administered the ROS developed by Allport and Ross (1967) and scored it by employing the instructions provided by Robinson and Shaver (1973) as a measure consisting of intrinsic and extrinsic subscales. Ghorbani et al also utilized the 14-item Muslim Attitudes Towards Religion Scale (MARS) developed by Wilde and Joseph (1997) and tried to find out whether they bear any significant relationship with anxiety, depression, somatization, obsessive compulsion and interpersonal sensitivity scales measured

by the Hopkins Symptom Checklist (Derogatis et al., 1974). When they administered the measures to 178 university students in Iran, they found significant relationships among the subscales of the measures utilized.

In spite of contributing to human understanding of religiosity, the study of Almeida (2006) and Ghorbani et al. (2000) both suffer from treating the ROS as a measure consisting of two subscales without indicating whether it had any psychometric/factorial validity in the society in which they were conducted. As Brewczynski and MacDonald (2006) [henceforth BM06] convincingly argued, "virtually all of the empirical research done in the psychology of religion in general, and with the ROS in particular, have been done with English-speaking participants" (p. 64). Therefore, they administered the ROS to 385 undergraduate students in Poland and employed the structural equation modeling (SEM) to study its underlying factors.

The present study has an objective similar to BM06 in that it embarks on exploring the factorial structure of the ROS within a Persian-speaking society where Islam is practiced as its official religion. However, it differs from their study in two ways. First, the SEM is *not* considered as an appropriate measure of factorial validity in this study because its results are not compatible with those found in experimental designs.

Khodadady, Pishghadam and Fakhar (2010) [henceforth KPF10], for example, designed an experimental study to explore the relationship among reading comprehension ability, grammar and vocabulary knowledge because based on an SEM design Shiotsu and Weir (2007) [henceforth SW07] claimed that syntactic knowledge is relatively more significant than "vocabulary breadth in predicting text reading comprehension test performance" (pp. 123-124). The claim was based on the regression and correlation summary of their study 3 in which the three measures of syntax, reading comprehension and vocabulary were administered to 591 participants as shown in Table 1. As can be seen, the correlation coefficient obtained between syntax and reading (.85) is higher than that of vocabulary and reading (.79).

Table 1

Regression and correlation coefficients obtained in two studies

		Reading (Traditional MCIT) ×		Reading (Schema-Based Cloze MCIT) ×	
		Syntax	Vocabulary	Syntax	Vocabulary
SW07	Beta	.64	.25	-	-
	r	.85	.79	-	-
	% explained	72%	62%	-	-
KPF10	r	.77	.82	.43	.57
	% explained	59%	67%	18%	32%

KPF10 designed and employed two types of reading comprehension tests, i.e., traditional multiple choice item test (MCIT) and schema-based cloze MCIT, and administered them along with syntax and vocabulary MCITs to 82 female learners of English as a foreign language (TEFL) after they divided the participants into control and experimental groups and taught them syntax and vocabulary explicitly for one semester. Their results showed that the explicit teaching of syntax does bring about significantly higher performance on the part of experimental group. However, the performance of both groups showed that syntactic knowledge does not show higher correlations with the reading comprehension ability than the vocabulary knowledge and thus challenged the findings obtained via SEM.

As can be seen in Table 1, the correlation coefficients obtained among the traditional MCIT (.77), schema-based cloze MCIT (.43) measuring the reading comprehension ability and the syntax test is noticeably lower than those obtained among the vocabulary test and the traditional MCIT (.82), and schema-based cloze MCIT (.57). Although as measures of reading comprehension ability traditional MCITs and schema-based cloze MCITs are developed on two different theories (see Khodadady, 1999), they both show higher correlations with the vocabulary than with the syntactic knowledge and thus challenge SW07's findings. As can be seen in Table 1, while syntactic knowledge explains only 18% of variance in the schema-based cloze

MCIT, the amount of variance explained by vocabulary knowledge is almost twice, i.e., 32%.

The second way in which the present study differs from that of BM06 is its utilization of three methods of factor extraction, i.e., the Maximum Likelihood (ML), Principal Axis Factoring (PAF), and the Principal Component Analysis (PCA) for the extraction of latent variables (LVs) in the ROS. This study is therefore developed to find out whether the items comprising the ROS will load on two factors as accepted by Ghorbani et al (2000) or three factors as the SEM results obtained by BM06 show. It also attempts to find out whether the ML, PAF and PCA yield the same number of items having similar magnitudes of loading on the same LVs when they are rotated.

2. Methodology

2.1 Participants

Three hundred twenty nine, 251 female (76.3%) and 78 male (23.7), undergraduate university students majoring in agriculture, n = 123 (37.4%), English language and literature, n = 95 (28.9%), theology, n = 95 (28.9%), and architecture, n = 16 (4.9%) at Ferdowsi University of Mashhad voluntarily took part in the present study. Their age ranged from 18 to 38 (Mean = 20.78, SD = 2.335) and they all spoke Persian as their mother language and practiced Islam as their religion.

2.2 Instrument

Following BM06 the original English version of 21-item ROS was translated into Persian and employed in the present study. (The English back translation version has been given in appendix to reach an international audience. Interested readers may, however, contact the corresponding author for the Persian version of the ROS.) It contains the 20 items developed by Allport and Ross (1967) and one more item, E21, added by Feagin (1964). They were all presented on a Likert scale having five points, i.e., completely disagree, disagree, no idea, agree and completely agree to which the values of 1, 2, 3, 4, and 5 were assigned, respectively.

In translating the items comprising the ROS schema theory was followed (see Khodadady, 2001; 2008; Seif and Khodadady, 2003). Based on this theory, all the words/phrases constituting the items were translated by employing their semantic, syntactic and discoursal

relationships with each other and their best Persian equivalents were chosen by employing the same relationships governing their Persian equivalents. The translated items were then submitted to two specialists in the Persian Language and Literature Department of Ferdowsi University of Mashhad to be checked and approved in terms of their Persian academic style.

Schema theory solves the unresolved problem faced by BM06 when they tried to translate the intrinsic item, "If I were to join a church group, I would prefer to join (1) a Bible Study group, or (2) a social fellowship." According to them, "Difficulty in translating this item related to the essential inadequacy of its content in the Polish context (i.e., American Bible study groups have no easily understood equivalent in Poland)." The schema *church* used in the item does not need to be related to America so that its Bible study groups become alien to the target readers. The best equivalent for the *church* in Iran is *mosque* if the item in which it occurs is to be read and responded by the majority Muslim Iranians. This means that the equivalents for (1) a Bible Study group and (2) a social fellowship ought to be chosen within a target context/discourse, i.e., Iranian mosque, hence (1) the Qur'ān study group and (2) religious boards.

2.3 Procedure

After translating the ROS into Persian and ensuring that its items were compatible with Islam and the Iranian culture, most instructors in agriculture, literature, theology and science faculties of Ferdowsi University of Mashhad were contacted and their cooperation was sought. Upon getting the approval of some, one of the researchers attended their classes and administered the ROS in person on a single occasion.

2.4 Data Analysis

The descriptive as well as inferential statistical analyses were carried out by utilizing the SPSS version 19.0. The reliability of the ROS was estimated via Cronbach Alpha. The Principal Component Analysis (PCA), Principal Axis Factoring (PAF), and Maximum Likelihood (ML) methods were employed to extract rotated LVs. Similar to Khodadady (2009), Kaiser criterion, i.e., eigenvalues higher than 1, was used to determine the number of LVs. Since Khodadady's study (2010) shows that having acceptably cross loading item is a common feature in social studies, it was decided that if an item cross

loaded acceptably, i.e., .30 and higher, on more than one factor, its highest loading on one single factor be adopted as its main contribution to the construct under investigation and its cross loadings on other factors be ignored. Following Khodadady and Hashemi (2010), the unrotated factor matrix was skipped and all correlation coefficients with their frequency and magnitudes were obtained and reported to answer the following four research questions.

Q1. How do the 21 items comprising the ROS correlate among themselves?

Q2. How many LVs will be extracted if the ML, PAF, and PCA are utilized?

Q3. How reliable will the ROS and extracted LVs be?

Q4. Will the number of items as well as loadings on the extracted LVs differ significantly from each other when the ML, PAF and PCA are utilized?

3. Results and Discussion

Table 2 presents the descriptive statistics of 21 ROS items correlating with each other. As can be seen, out of 210 correlation coefficients (CCs) only 67 (32%) correlate acceptably with each other. These results answer *the first research question* and show that the ROS consists of heterogonous items. Had it consisted of only two factors, most of its constituting items would have shown highly acceptable correlations with each other. The 47-item Characteristics of Effective English Language Teachers (CEELT), for example, consists of homogeneous items because out of 1080 CCs, 916 (84.8%) correlated acceptably with each other when Khodadady (2010) administered it to 1469 high school students in Iran.

Table 2

Frequency (F), percent (P) and cumulative percent (CP) of 210 ordered correlation coefficients (CC) obtained among the 21 items comprising the ROS

CC	F	P	CP	CC	F	P	CP	CC	F	P	CP	CC	F	P	CP
-.30	3	1.4	1.4	-.06	2	1.0	21.4	.17	4	1.9	50.0	.41	3	1.4	85.7
-.28	1	.5	1.9	-.05	3	1.4	22.9	.18	5	2.4	52.4	.42	2	1.0	86.7
-.27	1	.5	2.4	-.04	1	.5	23.3	.19	4	1.9	54.3	.43	1	.5	87.1
-.26	3	1.4	3.8	-.03	1	.5	23.8	.21	2	1.0	55.2	.44	2	1.0	88.1
-.25	2	1.0	4.8	-.02	1	.5	24.3	.22	4	1.9	57.1	.45	4	1.9	90.0
-.24	1	.5	5.2	-.01	5	2.4	26.7	.23	6	2.9	60.0	.47	3	1.4	91.4
-.22	1	.5	5.7	.00	3	1.4	28.1	.24	7	3.3	63.3	.48	5	2.4	93.8
-.21	1	.5	6.2	.01	2	1.0	29.0	.25	3	1.4	64.8	.49	1	.5	94.3
-.20	2	1.0	7.1	.02	1	.5	29.5	.27	2	1.0	65.7	.50	1	.5	94.8
-.19	1	.5	7.6	.03	4	1.9	31.4	.28	5	2.4	68.1	.51	2	1.0	95.7
-.18	3	1.4	9.0	.04	2	1.0	32.4	.29	3	1.4	69.5	.52	1	.5	96.2
-.17	1	.5	9.5	.05	1	.5	32.9	.30	4	1.9	71.4	.54	1	.5	96.7
-.16	3	1.4	11.0	.06	5	2.4	35.2	.31	1	.5	71.9	.55	1	.5	97.1
-.15	3	1.4	12.4	.07	4	1.9	37.1	.32	2	1.0	72.9	.57	1	.5	97.6
-.14	4	1.9	14.3	.08	2	1.0	38.1	.33	3	1.4	74.3	.58	2	1.0	98.6
-.13	1	.5	14.8	.09	5	2.4	40.5	.34	5	2.4	76.7	.68	1	.5	99.0
-.12	2	1.0	15.7	.11	3	1.4	41.9	.35	2	1.0	77.6	.71	1	.5	99.5
-.11	3	1.4	17.1	.12	2	1.0	42.9	.36	3	1.4	79.0	.72	1	.5	100
-.10	2	1.0	18.1	.13	1	.5	43.3	.37	1	.5	79.5	Total	210	100	
-.09	2	1.0	19.0	.14	6	2.9	46.2	.38	4	1.9	81.4				
-.08	1	.5	19.5	.15	2	1.0	47.1	.39	2	1.0	82.4				
-.07	2	1.0	20.5	.16	2	1.0	48.1	.40	4	1.9	84.3				

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Upon estimating the magnitude of correlational relationships among the ROS items, the KMO and Bartlett's Test was run to find out whether applying factor analysis to the data was appropriate. It yielded .88 as the obtained value of Kaiser-Meyer-Olkin Measure of Sampling Adequacy. According to Kaiser (1974), KMOs in the .80s are "meritorious," (cited in DiLalla and Dollinger, 2006: 250) and the LVs extracted can thus be accepted as underlying factors of ROS. Furthermore, the significant Bartlett's Test of Sphericity, i.e., X^2 = 2561.210, df = 210, $p < .001$, indicated that the correlation matrix was not an identity matrix.

Table 3 presents the LVs extracted via ML, PAF and PCA, respectively. As can be seen, all the three methods extracted four variables and thus provided the answer to the second question dealing with the number of LVs underlying the Persian version of ROS. These results provide empirical evidence to challenge the logical classification of the items into two subscales, i.e., intrinsic (I) and extrinsic (E). They also challenge the three LVs extracted via SEM by BM06 and show that religious orientation is multifactorial within an Iranian context. (The LVs will be discussed shortly.)

Table 3

LVs extracted from the Persian version of ROS via ML, PAF and PCA

BM06	ML				PAF				PCA			
	LV1	LV2	LV3	LV4	LV1	LV2	LV3	LV4	LV1	LV2	LV3	LV4
I1	*	.64	.31	-.37	.63	*	.31	-.37	.72	*	*	-.32
I2	.52	.41	*	*	.44	.51	*	*	.56	.51	*	*
I3	*	*	*	*		*	*	*	*	*	*	*
I4	*	.60	*	*	.62	*	*	*	.75	*	*	*
I5	*	.73	*	-.32	.72	*	*	-.32	.78	*	*	*
I6	.37	.64	.32	-.31	.65	.35	.33	-.30	.72	*	*	*
I7	*	.39	.55	*	.39	*	.55	*	.48	*	.56	*
I8	*	*	.59	*	*	*	.58	*	*	*	.60	*
I9	*	*	.66	*	*	*	.66	*	*	*	.69	*
Es1	*	*	.58	*	*	*	.58	*	*	*	.64	*
Ep2	.68	*	*	*	*	.68	*	*	*	.74	*	*
Ep3	.73	*	*	*	*	.72	*	*	*	.76	*	*
E4	*	*	*	.52	*	*	*	.51	*	*	*	.58
E5	*	*	*	.58	*	*	*	.58	*	*	*	.66
E6	*	*	*	.51	*	*	*	.51	*	*	*	.67
Ep7	*	*	.40	.33	*	*	.42	.33	*	*	.57	.32
E8	*	*	*	.53	*	*	*	.55	*	*	*	.62
Ep9	.54	*	*	*	*	.54	*	*	*	.70	*	*
E10	*	*	*	.63	*	*	*	.63	*	*	*	.73
Ep11	.59	*	*	*	*	.60	*	*	.34	.65	*	*
Es12	*	*	.55	*	*	*	.55	*	*	*	.70	*

* Loadings less than .30

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The results presented in Table 3 are compatible with Khodadady and Hashemi's (2010) findings. They administered the 34 items comprising the Beliefs about Language Learning Inventory (BALLI) developed by Horwitz (1985; 1988) to 418 undergraduate and graduate students of English to find out whether the 34 beliefs held by undergraduate and graduate learners would load on five LVs corresponding to the five major logical areas of language learning established by the designer of the BALLI, i.e., 1) Difficulty of language learning, 2) Foreign language aptitude, 3) the nature of language learning, 4) Learning and communication strategies, and 5) Motivations and expectations. The application of the PCA and PAF and rotating the loadings resulted in the extraction of 14 LVs, indicating that the BALLI was addressing issues far more diverse than the five logically established areas of foreign language learning.

The results presented in Table 3 also challenge the number of LVs extracted by SEM which is based on an extraction method other than PAF and PCA. Since BM06 extracted three factors, i.e., Revised Intrinsic, Social Extrinsic (Es), and Personal Extrinsic (Ep), after they revised some ROS items and ran *six* confirmatory ***Maximum Likelihood*** (ML) factor analyses by using SEM, the same method, i.e., ML, was used in the present study by utilizing the SPSS to find out whether the extraction method upon which the SEM rests yields the same number of LVs having the same loading items as extracted by the PAF and PCA.

Table 4 presents the descriptive statistics and reliability coefficients of the rotated LVs extracted by ML, PAF, and PCA in the present study. Since the reliability coefficient obtained for the ROS was .80 and those of its LVs ranged from .87 to .70 they answer *the third question* and establish the ROS as a reliable measure of religious orientation in Iran. As it can also be seen in Table 4, the ROS is neither two dimensional as assumed by Allport and Ross (1967) and taken for granted by Ghorbani et al (2000). Nor is it three dimensional as found by BW06. The constituting items of factor three, i.e., Ep7, Es1, Es12, I7, I8, and I9, for example, reject the identification of two distinct extrinsic LVs, i.e., Ep and Es motivations, by BM06 because they load with three intrinsic items, i.e., I7, I8, and I9, on the third factor extracted by three methods in this study.

Table 4

Factors extracted by ML, PAF and PCA and their loading items

LVs	Method	# of items	No cross loading	Eigenvalue	Variance explained	Alpha
1	ML	5	Ep11, Ep2, Ep3, Ep9, I2	2.486	11.838	.79
	PAF	4	I1, I4, I5, I6	2.442	11.629	.87
	PCA	5	I1, I2, I4, I5, I6	3.390	16.141	.86
2	ML	4	I1, I4, I5, I6	2.391	11.388	.87
	PAF	5	Ep11, Ep2, Ep3, Ep9, I2	2.440	11.619	.79
	PCA	4	Ep11, Ep2, Ep3, Ep9	2.774	13.211	.76
3	ML	6	Ep7, Es1, Es12, I7, I8, I9	2.344	11.162	.77
	PAF	6	Ep7, Es1, Es12, I7, I8, I9	2.343	11.157	.77
	PCA	6	Ep7, Es1, Es12, I7, I8, I9	2.718	12.941	.77
4	ML	5	E10, E4, E5, E6, E8	2.170	10.333	.70
	PAF	5	E10, E4, E5, E6, E8	2.176	10.364	.70
	PCA	5	E10, E4, E5, E6, E8	2.665	12.690	.70

It seems that SEM provides researchers with a statistical test through which they can justify their personal positions. After running six ML via SEM, BM06, for example, extracted their third factor upon which extrinsic items, i.e., Ep2, Ep3, Ep7, Ep9, and Ep11, loaded acceptably. The same extraction method, i.e., ML, however, resulted in having the same five items load on the *first* factor along with *I9* in the present study as shown in Table 4. This very difference might explain why BM06 ran six MLs instead of one before they could come up with a three factorial solution to their problem. The PAF and PCA, nonetheless, show that the constituting items of the first factor are totally different from those extracted via ML, i.e., they are intrinsic in nature. This difference can be explained by focusing on mean loadings and the nature of values upon which the extraction methods rest.

Table 5 presents the mean loading of items comprising the four factors extracted by ML, PAF and PCA. As can be seen, the mean of the PCA, i.e., .67, is different from that of the ML (.5885) and PAF (.5895). The one-way ANOVA analysis showed that the difference in the means obtained is significant ($F = 7.688$, $df = 2$, $p < .001$). The Scheffe post hoc test, however, showed that while the mean of the

ML and PAF differ significantly from the PCA, they do not differ from each other because they yield the same rounded mean loadings, i.e., .59, indicating that the two methods extract the same LVs with one single difference, i.e., the order of the first two LVs.

Table 5

Descriptive statistics of the mean loadings obtained by the ML, PAF and PCA

Method	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
ML	20	.5885	.07969	.01782	.5512	.6258	.40	.73
PAF	20	.5895	.07619	.01704	.5538	.6252	.42	.72
PCA	20	.6700	.07011	.01568	.6372	.7028	.56	.78
Total	60	.6160	.08355	.01079	.5944	.6376	.40	.78

The unaddressed problem with employing the SEM as a confirmatory factorial method is first revealed when the extraction method, i.e., the ML, through which its LVs are extracted is compared with the PAF and PCA. As shown in Table 4, the number and nature of items loading on the first LVs extracted by the PAF and ML are, for example, logically different, which may somehow explain why six MLs are run in SEM designs such as the one conducted by BM06. The very simplicity of the PAF in terms of being run once shows its superiority over the SEM. The superiority is further emphasized when the LVS extracted by the PAF and ML are compared with each other.

Although the PAF rests on original correlation matrix whereas the ML rests on parameter estimates that are most likely to have produced the observed correlation matrix, they both explain almost the same amount of variance in the rotated LVs extracted as shown in Table 6. As can be seen, the ML, PAF and PCA extracted the same number of LVs which explain the same amount of variance, i.e., 54.984, when the initial Eigenvalues are taken into account. However, when Rotation Sums of Squared Loadings are adopted as the criteria, the amount of variance explained by the PAF and ML drops to 44.768 and 44.721, respectively, while that of the PCA remains the same, i.e., 54.984, indicating that rotating the loadings does not affect the variances explained by the PCA and thus renders it questionable as a method of factorial analysis.

Table 6

Total Variance Explained by Components (Cs) and Factors (Fs) extracted by PCA and PAF

LVs	#	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
ME	1	6.044	28.783	28.783	5.558	26.467	26.467	2.486	11.838	11.838
	2	2.780	13.239	42.022	2.142	10.202	36.669	2.391	11.388	23.226
	3	1.616	7.693	49.715	1.050	5.002	41.670	2.344	11.162	34.388
	4	1.107	5.269	54.984	.641	3.051	44.721	2.170	10.333	44.721
PAF	1	6.044	28.783	28.783	5.591	26.623	26.623	2.442	11.629	11.629
	2	2.780	13.239	42.022	2.167	10.319	36.943	2.440	11.619	23.247
	3	1.616	7.693	49.715	1.050	5.000	41.943	2.343	11.157	34.405
	4	1.107	5.269	54.984	.593	2.825	44.768	2.176	10.364	44.768
PCA	1	6.044	28.783	28.783	6.044	28.783	28.783	3.390	16.141	16.141
	2	2.780	13.239	42.022	2.780	13.239	42.022	2.774	13.211	29.353
	3	1.616	7.693	49.715	1.616	7.693	49.715	2.718	12.941	42.293
	4	1.107	5.269	54.984	1.107	5.269	54.984	2.665	12.690	54.984

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It is argued that the very insensitivity of the PCA to the amount of variance when the loadings are rotated distorts the LVs it extracts and thus does not provide empirically sound variables explaining what underlies psychological measures as it must. This argument is further supported when the number of acceptably loading items (ALIs), i.e., .30 and higher, on the LVs are taken into account. As can be seen in Table 3, the number of ALIs on the four LVs extracted by the ML and PAF, i.e., 29, is more than the PCA, i.e., 25. It is therefore suggested that the PCA is treated cautiously in establishing the factorial validity of psychological measures.

Table 7 presents the correlation coefficients obtained among the four LVs extracted via ML, PAF, PCA. As can be seen, the four LVs extracted by the three methods all show significant relationships with the ROS and thus establish it as an internally valid measure of religious orientation. The three methods also show the same degree of relationship between the ROS and its third and fourth LVs. They do, however, differ noticeably from each other in terms of their first and second LVs' relationships with the ROS and thus necessitate scrutinizing the correlation coefficients obtained among its items.

Table 7

Correlations among the four LVs extracted via ML, PAF, PCA.

LVs	ROS			LV1			LV2			LV3		
	ML	PAF	PCA	ML	PAF	PCA	ML	PAF	PCA	ML	PAF	PCA
1	.79*	.70*	.74*									
2	.70*	.79*	.76*	.51*	.51*	.51*						
3	.77*	.77*	.77*	.42*	.56*	.56*	.56*	.42*	.40*			
4	.16*	.16*	.16*	.02	-.37*	-.34*	-.37*	.02	.04	-.15*	-.15*	-.15*

* Correlation is significant at the 0.01 level (2-tailed).

Table 8 presents the CCs among the 21 items of ROS. As it can be seen, among the 210 CCs, items six and five show the highest correlations with I1, i.e., .72 and .71, respectively. Similarly, these two items show the highest loadings on the first rotated LV extracted by the PAF and PCA (see Table 3), indicating that these two methods are empirically superior to the ML because they are based on the highest *observed* relationships among items rather than their parameter estimates. Between the two methods, the PAF is, however, empirically and logically superior to the PCA because it excludes item I2 from acceptably loading on the first factor because it has the *highest* CC with Ep11, i.e., .50, and thus loads the third, i.e., .60, on the second LV extracted by the PAF.

Table 8

Correlation coefficients obtained among the items comprising the ROS

	I1	I2	I3	I4	I5	I6	I7	I8	I9	Es1	Ep2	Ep3	E4	E5	E6	Ep7	E8	Ep9	E10	Ep11
I2	.42																			
I3	.24	.23																		
I4	.48	.48	.11																	
I5	.71	.41	.17	.57																
I6	.72	.48	.21	.58	.68															
I7	.54	.23	.12	.44	.47	.51														
I8	.47	.30	.18	.33	.38	.55	.52													
I9	.45	.30	.19	.40	.35	.40	.49	.51												
Es1	.39	.24	.17	.33	.31	.47	.42	.45	.48											
Ep2	.33	.39	.25	.29	.30	.38	.27	.38	.28	.29										
Ep3	.34	.48	.18	.34	.30	.44	.24	.32	.24	.22	.58									
E4	-.30	-.04	.01	-.11	-.19	-.25	-.17	-.14	-.12	-.16	.03	.06								
E5	-.28	.04	.02	-.03	-.27	-.24	-.16	-.11	-.10	-.05	.04	.06	.41							
E6	-.18	-.05	-.01	-.07	-.20	-.15	-.14	-.20	-.14	.06	-.11	-.05	.23	.23						
Ep7	-.01	.09	.11	.05	-.07	.00	.14	.14	.22	.21	.15	.18	.14	.15	.22					
E8	-.26	-.15	.06	-.15	-.30	-.26	-.09	-.13	-.16	-.14	-.01	-.02	.28	.38	.28	.25				
Ep9	.08	.23	.09	.16	.07	.19	.03	.09	.07	.14	.36	.40	.19	.17	.08	.25	.07			
E10	-.30	-.06	.03	-.09	-.26	-.25	-.21	-.22	-.18	-.18	-.08	-.06	.34	.37	.34	.11	.36	.12		
Ep11	.35	.50	.19	.36	.28	.43	.24	.28	.22	.24	.45	.45	.00	.07	-.01	.17	-.12	.40	.01	
Es12	.16	.13	.09	.23	.14	.24	.29	.34	.41	.32	.18	.14	-.01	-.10	.06	.27	.00	.09	.03	.18

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In sharp contrast to the PAF, the ML extracts items Ep3, Ep2, Ep11, Ep9, I2 and I6 as the acceptable loadings on its first LV. In other words, whereas the PAF extracts logically homogeneous items on its first LV, i.e., they are all intrinsic, the first LV extracted by the ML comprises logically heterogeneous items, i.e. they are both intrinsic and extrinsic. Furthermore, Ep3, the item loading the highest (.73) on LV1 extracted by the ML, shows its strongest relationship with Ep2, i.e., .58, among the 210 CCs. This magnitude of CC is far below the CC of .71 obtained between I1 and I5. The extraction of an item with a low CC as the highest loading item on the first factor provides the second reason to question the acceptability of ML as an extraction method employed in the SEM in that it is a matter of parametric estimate rather than empirically observed correlation to suggest the CC of .58 rather than .71 as the first LV explored by a psychological measure such as the ROS.

4. Conclusion

This study explored the factorial validity of the Persian ROS by administering it to a representative sample of undergraduate university students in Iran. When the three methods of ML, PAF and PCA were applied to the data, four LVs were extracted indicating that the ROS is neither a two nor a three dimensional measure of religious orientation as suggested in the literature. It was also found that the PCA and PAF yield different number of acceptably loading items whose mean differs significantly from method to method. It is suggested that the PAF is adopted in extracting factors because it neither inflates the items loading on the first factor nor distorts the magnitude of items which load acceptably on other factors when they are rotated and thus provides a more accurate measure of whatever factors instruments such as the ROS are designed to measure.

A comparison of the four factors obtained via ML and PAF in the present study suggest that the former extracts its first factor from the items whose CCs are noticeably lower than the ones obtained by the PAF and thus necessitates running several ML analyses before a logically acceptable pattern of loadings could be found among the items comprising the ROS when SEM is adopted as a confirmatory method of factor analysis. In contrast, a single run of the PAF provides the most empirical type of loadings among the items which show strong correlations with each other. The findings of the present study, there-

fore, suggest that the PAF be adopted not only in exploratory but also in confirmatory studies to validate psychological measures in various contexts such as Iran and Poland. In other words, the adoption of PAF as a confirmatory method will possibly yield similar or comparable results in countries where different religions are practiced.

REFERENCES

Almeida, Claudia Da Silva (2006), *Religious Orientation and Pressure in Undergraduate Engineering Students* (MA thesis; Johannesburg: University of the Witwatersrand).

Allport, Gordon Willard (1950), *The Individual and His Religion: A Psychological Interpretation* (New York: MacMillan).

Allport, G. W. and Ross, J. Michael (1967), "Personal Religious Orientation and Prejudice," *Journal of Personality and Social Psychology* 5/4, 432-443.

Brewczynski, Jacek and MacDonald, Douglas A. (2006), "Confirmatory Factor Analysis of the Allport and Ross Religious Orientation Scale with a Polish Sample," *The International Journal for the Psychology of Religion* 16/1, 63-76.

Derogatis, Leonard R. & Lipman, Ronald S. & Rickles, Karl & Uhlenhuth, E. H. and Covi, Lino (1974), "The Hopkins Symptom Checklist (HSCL): A Self-report Symptom Inventory," *Behavioral Science* 19/1, 1-15.

Feagin, Joe R. (1964), "Prejudice and Religious Types: A Focused Study of Southern Fundamentalists," *Journal of the Scientific Study of Religion* 4/1, 3-13.

Genia, Vicky (1993), "A Psychometric Evaluation of the Allport-Ross I/E Scales in a Religiously Heterogeneous Sample," *Journal for the Scientific Study of Religion* 32/3, 284-290.

Ghorbani, Nima & Watson, P. J. & Ghramaleki, Ahad Framarz & Morris, Ronald J., and Hood, Ralph W. (2000), "Muslim Attitudes towards Religion Scale: Factors, Validity and Complexity of Relationships with Mental Health in Iran," *Mental Health, Religion & Culture* 3/2, 125-132.

Khodadady, Ebrahim (1999), *Multiple-Choice Items in Testing: Practice and Theory* (Tehran: Rahnama).

_____ (2001), "Schema: A Theory of Translation," in Sonia Cunico (ed.), *Training Translators and Interpreters in the New Millennium, Portsmouth 17th March 2001 Conference Proceedings* (Portsmouth, England:

University of Portsmouth, School of Languages and Areas Studies), 107-123.

_____ (2008), "Measuring Translation Ability and Achievement: A Schema-Based Approach," *Quarterly Journal of Humanities, Al-Zahra University* 18/70, 56-76.

_____ (2009), "The Beliefs about Language Learning Inventory: Factorial Validity, Formal Education and the Academic Achievement of Iranian Students Majoring in English," *Iranian Journal of Applied Linguistics* (*IJAL*) 12/1, 115-165.

_____ (2010), "Factors Underlying Characteristics of English Language Teachers: Validity and Sample Effect," *Iranian Journal of Applied Linguistics* (*IJAL*) 13/2, 47-74.

Khodadady, E. and Hashemi, Mohammad Reza (2010), "Construct Validity of Beliefs about Language Learning: Componential or Factorial," *Ferdowsi Review* 1/1, 3-20.

Miner, Maureen (2009), "The Impact of Child-Parent Attachment, Attachment to God and Religious Orientation on Psychological Adjustment," *Journal of Psychology and Theology* 37/2, 114-124.

Robinson, John P. and Shaver, Phillip R. (eds.) (1973), *Measures of Social Psychological Attitudes (Revised edn.*) (Ann Arbor, MI: Institute for Social Research).

Vaus, David A. de (1985), *Surveys in Social Research* (Sydney: Allen & Unwin).

Weiten, Wayne (1988), "Pressure as a Form of Stress and Its Relationship to Psychological Symptomatology," *Journal of Social and Clinical Psychology* 6/1, 127-139.

_____ (1992), *Psychology: Themes and Variation* (Pacific Grove, CA: Brooks/Cole).

_____ (1998), "Pressure, Major Life Events and Psychological Symptoms," *Journal of Social Behaviour and Personality* 13/1, 51-68.

Wilde, Alex and Joseph, Stephen (1997), "Religiosity and Personality in a Moslem Context," *Personality and Individual Differences* 23/5, 899–900.

Appendix

The English back translation version of the Persian ROS used in the present study (PS) and its descriptive statistics along with those of Brewczynski and MacDonald (2006) [BM06]

No	Factors		Item	PS		BM06*	
	PS	BM06		Mean	SD	Mean	SD
I1	1	1	I try hard to carry my religion over into all my other dealings in life.	3.5	1.3	4.1	1.1
I2	2	1	Quite often I have been keenly aware of the presence of God or the Divine Being.	4.1	1.0	3.8	1.2
I3	-	-	The prayers I say when I am alone carry as much meaning and personal emotion as those said by me in the presence of people.	2.6	1.1	4.2	1.2
I4	1	1	It is important to me to spend periods of time in private religious thought and meditation.	3.6	1.1	3.7	1.4
I5	1	1	My religious beliefs are what really lie behind my whole approach to life.	3.5	1.2	3.8	1.3
I6	1	1	Religion is especially important to me because it answers many questions about the meaning of life.	3.8	1.2	3.6	1.4
I7	3	1	I read the literature about the religion.	3.2	1.2	2.6	1.3
I8	3	-	If I were to join a mosque group, I would prefer to join (1) a Quran Study group, or (2) a religious group.	3.1	1.3	4.3	1.0
I9	3	-	If not prevented by unavoidable circumstances, I attend mosques.	2.8	1.2	4.2	1.0
Es1	3	2	The mosque is most important as a place to formulate good social relationships.	2.7	1.2	2.0	1.2
Ep2	2	3	The purpose of prayer is to secure a happy and peaceful life.	3.6	1.3	4.0	1.1
Ep3	2	3	What religion offers me most is comfort when sorrows and misfortune strike.	3.6	1.3	2.3	1.4
E4	4	1	It doesn't matter so much what I believe so long as I lead a moral life.	2.7	1.2	1.5	2.5

E5	4	1	Although I am a religious person, I refuse to let religious considerations influence my everyday affairs.	2.5	1.1	2.0	1.2
E6	4	-	I pray chiefly because I have been taught to pray.	2.2	1.1	2.0	1.2
Ep7	3	3	A primary reason for my interest in religion is that my mosque is a congenial social activity.	2.5	1.0	3.2	1.4
E8	4	-	Occasionally I find it necessary to compromise my religious beliefs in order to protect my social and economic well-being.	2.3	1.1	3.3	1.4
Ep9	2	3	The primary purpose of prayer is to gain relief and protection.	3.5	1.2	3.2	1.5
E10	3	1	Although I believe in my religion, I feel there are many more important things in my life.	2.8	1.1	1.4	0.7
Ep11	2	3	Religion helps to keep my life balanced and steady in exactly the same way as my citizenship, friendships, and other memberships do.	3.6	1.1	1.4	0.9
Es12	3	-	One reason for my being a mosque member is that such membership helps to establish a person in the community.	2.4	1.1	2.8	1.5

* Means and SDs are rounded up