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Psychometric Properties of Multiple Intelligence Developmental Assessment Scales (MIDAS) for Adults in the Iranian Context

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Abstract
This study reports psychometric properties and derivation of norms for a Persian version of the Multiple Intelligence Developmental Assessment Scales (MIDAS) for Adults. After examining and confirming equivalency between English and Persian versions, translated and validated by Saeidi, Ostovar, Shearer, and Asghari Jafarabadi (2015), the scale was administered to a sample (N = 2146), including students, undergraduates, graduates, and adults from different provinces in Iran. The participants were at least 19 years old and above (M = 29.40, SD = 2.26). Out of 2146 samples, 1103 females and 1043 were males. To examine the validity and reliability properties of the scale, exploratory and confirmatory factor analyses, Cronbach Alpha (α) reliability correlation coefficients, and corrected item-total correlations were employed. Exploratory factor analysis using varimax rotation identified eight principal components, which accounted for 67.21% of the variance for 115 items. The internal consistency coefficient (α = .92; ranging from 0.89 to 0.93) was also very high. The confirmatory analysis generally replicated the original conceptualization of the MIDAS. According to the results, the Persian-MIDAS-adults questionnaire has good psychometric properties in the research community and can be safely used as a valid tool to assess MI in Iran.

***Keywords*:** psychometric properties, Persian-MIDAS-Adults, factor analysis, reliability, validity

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INTRODUCTION

During the course of its development, the concept of intelligence has witnessed the waxes and wanes experienced by any scientific concept. Initially, intelligence was regarded as a general mental capacity or a unidimensional concept called *g* factor (Spearman, 1904). Later, more multifaceted conceptions of intelligence came into vague with works such as Multiple Intelligences (MI) theory (Gardner, 1983) and triarchic model of intelligence (Sternberg, 1985). According to Gardner (1983), individuals possess eight autonomous kinds of intelligence which are linguistic, logical-mathematical, interpersonal, spatial, intrapersonal, musical, naturalistic, and bodily-kinesthetic intelligences. Such a view of intelligence diverged from the traditional notion of the concept which has been limited to considering intelligence quotient (IQ) alone (Gardner, 1983). As claimed by Gardner (1995), the education community has enthusiastically accepted MI theory as a means to account for individual differences of people in education.

In this regard, in the last few years, the number of schools implementing MI within their educational program has been increasing rapidly (e.g., Austin, 2016; Johnson & White, 2002; Suprapto, Liu, & Ku, 2017). Moreover, the interest in doing research concerning the effect and measurement of MI with regard to achievement and education in general, and English as a foreign language teaching and learning in particular, has gained rapid momentum in recent years (e.g., Batdı, 2017; Kornhaber, 2004; Marefat, 2007; Nasiri, Ketabi, & Dastjerdi, 2012; Pour-Mohammadi, Zainol-Abidin, & Bin-Yang-Ahmad, 2012; Razmjoo, 2008; Yurt & Polat, 2015). Yet, there is dearth of assessment tools with acceptable reliability and validity for measuring MI in spite of the great enthusiasm showed towards the MI concept since its development. Furthermore, some tests designed to measure students' intelligences were developed without a clear definition of the very constructs they were intended to measure (Armstrong, 1994). Consequently, there is a need for developing valid and reliable assessment tools to measure learners' abilities and preferences.

One of the exceptions is the Multiple Intelligence Developmental Assessment Scale (MIDAS) developed by Shearer (1994) in English language. The instrument was constructed to assess individuals' MI and was made through empirical and rational assessment tool construction methods (Saeidi et al., 2015). However, it is unwise to employ the instrument to different population inasmuch as the fact that various groups may have different characteristics in terms of traditions and cultures. Therefore, localized versions of the scale should be developed for the instrument to be successfully utilized with various populations. As our main concern in the present study is about the application of the instrument in the Iranian context, it is worth stating that researchers in Iran use the original version of MI scales, such as Armstrong's (1994) MI survey, which are developed in Western cultures and are used with native English speakers, or they just translate the target scale from its source language to Persian without going through validity and reliability processes needed for adapting a scale to be used in another context. Examples of such empirical studies in the field of ELT in Iran are those undertaken by Ahmadian and Ghasemi (2017), Hosseini (2003), Pishghadam and Moafian (2008), Saeidi (2009), and Tahriri and Yamini (2010). Such inclinations are due to the reason that there is lack of any instrument with psychometric properties to measure individual's MI in the Iranian context.

To fill this gap, Saeidi et al. (2015) attempted to first, translate MIDAS from its source language to Persian, and then estimate its reliability and content validity on a group of 110 participants chosen from Iranian adult population. The translation and content validity phases were performed by five experts, who were both bilingual in Persian and English and were informed of the MI theory and its application. These phases involved forward translation, followed by back-translation, review of the translations, final proofreading, and testing. Subsequently, Cronbach alpha reliability coefficient was used to examine the inter-scale correlation and intra-class correlation, and high Cronbach alpha reliability coefficient was reported for all items of the scale.

In short, the whole process, including translation, reliability, and content validity resulted in high validity and reliability of the scale, and it was concluded that Persian MIDAS (P-MIDAS) was a reliable and valid tool for assessing MI of Iranian adults. The present study is the continuation of the same line of research on adapting MIDAS in the context of Iran, initiated by Saeidi et al. (2015). Now that the scale had been successfully translated from English to Persian (Saeidi et al., 2015), in this empirical study, we further evaluated the psychometric properties of P-MIDAS through employing exploratory and confirmatory factor analyses, Cronbach alpha reliability correlation coefficients, and corrected item-total correlations. For this purpose, the Persian scale was administered to a sample of 2146 Iranian adults to check the reliability and validity of the instrument in the context of Iran. In other words, this study seeks to upgrade measuring ability of P-MIDAS and facilitate the employment of MI theory for the concerned parties (i.e., researchers, teachers, counselors, parents, etc.) in Iran.

LITERATURE REVIEW

Throughout history, the concept of intelligence has been defined in various ways. For instance, Spearman (1904) introduced intelligence as a general capacity (i.e., *g* factor) influencing individual's performance on measures of intelligence or any cognitive task. According to this view, intelligence was deemed to be a stable and unchangeable human capacity, which is fixed through lifetime (Eysenck, 1994). Spearman's (1904) justification for such a conceptualization of intelligence was that mental activities are similar in their primary purposes, although they are different in various components of the activities. One year later, Binet (1905) developed an intelligence test to measure IQ and identify the achievement levels of performance based on the test (as cited in Davis, Christodoulou, Seider, & Gardner, 2001). Although we witness the widespread use of the test even today, it is limited to measuring individual's mathematical and linguistic abilities. Later,

Sternberg (1985) introduced the triarchic model of intelligence, which included creative, analytical, and practical intelligence components. To shed more light on this theory, traditional definition of the intelligence was preserved through the introduction of analytical intelligence, while creative intelligence refers to one's ability to respond in a creative way to new stimuli and events. Finally, practical intelligence pertains to individual's ability to realize and successfully handle daily activities. Horn and Cattell (1966) stated that human intelligence consists of nine factors, which are crystallized intelligence, short-term memory, correct decision speed, fluid reasoning, auditory processing, quantitative knowledge, processing speed, visual processing, and long-term retrieval.

More specifically related to the concern of the present study, Gardner (1983) introduced the theory of MI which considered human mental ability to be composed of various autonomous types of intelligence which individuals possess to varying degrees. The intelligence types accounted for by the theory are: logical-mathematical, intrapersonal, bodily-kinesthetic, naturalist, interpersonal, musical, spatial, and linguistic intelligences. Gardner (1993) refers to intelligence as a bio-psychological concept employed in processing information in certain ways, and the process is aimed to handle problematic situation that are bound to a specific culture for their appropriate interpretation. Additionally, Gardner's theory challenged the general obsession with measuring linguistic and logical-mathematical intelligences as the sole dimensions of human's intellectual ability. According to Gardner, other forms of intelligence are equally important and should be attended to as individuals possess and exhibit a wide range of interests and abilities.

Concerning the application of MI theory in education, it should be mentioned that few theories in the history of education have had the impact comparable to that of MI theory. As maintained by Ahvan and Zeinali Pour (2016), Gardner's (1983) MI theory has been appreciated and used by many school officials, instructors, and parents to discover and solve educational problems. In this regard, various schools have designed their curricula by

considering various types of intelligence and have developed classrooms and teaching atmosphere representing the reflection of MI theory (Sulaiman, Hassan, & Yi, 2011). More particularly, MI theory has been enthusiastically embraced and applied by researchers in the field of ELT across the globe (e.g., Ahmadian & Ghasemi, 2004; Chew, 2009; Hạnh, 2017; Morgan & Fonseca, 2004; Pour-Mohammadi et al., 2012). This widespread acceptance and application of the concept in the realm of general education and ELT would be due to the diversity of human's intellectual capacities, which should be accounted for in any educational program to become successful. For instance, MI theory can take into account MI in designing online supplementary learning courses as it plays an influential role in learners' success in this process (Lopez & Patron, 2012). This finding was corroborated by Perveen (2018), who stated that multimodal learning analytics in online education have the potential to improve learners' MI and multi-literacies. Similarly, a research study, done on 46 first grade children of an elementary school located in Turkey, focused on examining the importance of MI theory and providing some ways to improve students' intelligence levels. The results have revealed that incorporating drama education in the education program have the potential to impact students' musical-rhythmic intelligence (Köksal Akyol, 2016).

In another study aiming to improve students' MI and learning, game-based learning as a new teaching methodology was found to increase levels of linguistic, naturalistic, and logical-mathematical intelligence and learning when applied to a group of 119 primary education students chosen from 7 schools in Valencia (Del-Moral Pérez, Guzmán-Duque, & Fernández-García, 2018). Furthermore, Yu (2017) proposed that the development of an English education program in colleges, which is based on interactive teaching and MI theory, could facilitate foreign language learning of college students. In two other studies conducted on EFL major students at the Vinh University, it was found that first, integrating the MI-based homework to the course plan of a reading class enhanced students' vocabulary learning and second, EFL students' MI profiles affected their vocabulary learning

strategy use and their perceptions of vocabulary learning strategy usefulness (Hanh, 2017; Hanh & Tien, 2017).

In the same line, as an implication of her empirical study, Saeidi (2009) suggested that to enhance the effectiveness of grammar instruction in ELT context in Iran, MI can be integrated into focus on form instruction in order to simultaneously cater for different intelligence types of learners and provide them with meaningful tasks with secondary attention to form. Furthermore, in another empirical study, Estaji and Nafisi (2014) examined the extent to which MI theory was instilled into EFL young learners' textbooks in the context of Iran. The analysis of the materials revealed that the most dominant type of intelligence identified in the textbooks was verbal/linguistic intelligence, while the least recognized type was naturalistic intelligence. Besides, no instances of spiritual and existential intelligences were observed, and the remaining intelligence types were more or less equally distributed among the textbooks. Based on the results, the authors recommended that stakeholder, material developers, policy makers, and administrators who are involved in the processing of designing materials incorporate all intelligence types when developing materials for EFL young learners.

Regarding the assessment of MI, one of the instruments used in this regard is MIDAS, which was developed in 6 years by the Western psychologist Shearer (1994) to be used in the Western culture. MIDAS, as a self-report inventory, is an effective tool to gain a descriptive assessment of a person's or student's MI profile in English language. The scale consists of daily life questions which are rooted in American culture (Shearer, 2004). There are some practical reasons regarding the employment of MIDAS. First, MIDAS equips interested parties with useful information about a person's intellectual development and predispositions not usually obtained through administering standard aptitude and intelligent assessment tools. Second, MIDAS provides information relating directly to people's experiences which are useful in informing curriculum development, instructional approaches, individualized learning, and counseling process

(Shearer, 1994). MIDAS contains four versions which can be used for various age groups; MIDAS for adults is a 119-items self or by others report. The Teen-MIDAS version is designed for those individuals between the ages of 14 and 18. There are two 80-items versions of MIDAS-KIDS used for children ranging from nine to 14 years old. Finally, MIDAS Child is developed for children from six to nine years old (Gardner, 1993).

Numerous studies of their reliability and validity (e.g., Shearer, 1994; Shearer, 2012a; Shearer & Jones, 1994) indicated that MIDAS surveys can reasonably estimate a person's MI strengths and limitations. Due to its widespread use, MIDAS was translated into different languages in order to be applied in various cultures and contexts for different populations. For instance, Yoong (2001) translated the scale into Malay language for it to be employed in the Malaysian culture, while Miller (Shearer, 2003) has translated MIDAS to Chinese language to be utilized in Private Chinese's schools. In addition, MIDAS was also adapted in many other countries such as, Spain, Germany, Denmark, Switzerland, and Romania (Shearer, 2003), and it was translated into Korean, Chilean, Egyptian, and Taiwanese for research purposes (Shearer, 2012a).

Before explaining the employment of MI scales in the context of Iran, there are some significant points to be mentioned regarding the application of MI theory in Iran's education. The education system in Iran is undergoing a process of change and reform in which quality-oriented projects seek to promote the overall development of individuals that is in line with MI theory. Therefore, using MI theory as a teachings tool is necessary to stimulate educational reform and intelligence development of individuals. However, since there is a lack of instrument with psychometric properties to measure individual's MI in Iran, some researchers, teachers or psychologists might use any self-made MI inventory or translated versions of the previously developed MI scales without first establishing their validity and reliability. They may also use validated and reliable MI scales, which are developed to be used in other contexts. For instance, Ahmadian and Ghasemi (2017) employed Armstrong's (1993) MI scale for measuring

different types of intelligence in a study done on 50 EFL students at Tehran University of Medical sciences, Iran. The aim of the study was to discover the possible links between the participants' self-efficacy, MI, and language learning strategies. The researchers did not explain whether they first translated the scale into Persian and then administered it to the students or whether they distributed the original English version of the survey among the participants. However, either case that they may have employed would deteriorate the credibility of their results since the scale was not first adapted and validated for use in the context of Iran.

Similarly, in another study examining the role of MI-based instruction in the EFL context in Iran, Tahriri and Yamini (2010) used the Armstrong's (1993) MI survey to measure a group of female Iranian EFL students' levels of MI. In the article, the authors reported that before employing the scale in their study, they translated it into Persian and its reliability was assessed through back translation. In other words, they just translated the scale into Persian without going through comprehensive validation and adaptation of the Persian version of the instrument. Regarding the translation of scales, it should be noted that translation may affect the validity of an instrument for measuring the underlying construct(s). Researchers have cautioned that when translating verbal items of a scale into other languages, there are two problems which should be attended to in order for the instrument to represent its original underlying components. First, researchers need to ensure that the semantic content of the scale is authentic. Second, they are required to ensure readability and appropriacy of the scale with regard to the target respondents (Cai, 2004). Furthermore, some of the instruments measuring MI, which are available and adapted to Persian language to be implemented in Iran are limited to IQ measurement. Examples of such tests are Wechsler Adult Intelligence Scale (WAIS), Wechsler Intelligence Scale for Children (WISC), and Stanford-Binet Intelligence Scale-Fourth Edition (SBIS-IIII) (Hosseini, 2003).

To overcome this shortage of valid and reliable instruments assessing MI in Iran, Saeidi et al. (2015) attempted to translate, adapt, and

validate MIDAS within Iranian adults' population. The participants on whom they carried out the study were 110 individuals, both male and female, from various educational levels and majors. Having gone through proper translation, content validity, and Cronbach alpha reliability stages, the researchers reported high validity and reliability for the Persian version of MIDAS. To continue and expand the same line of research, the present study seeks to lend P-MIDAS (Saeidi et al., 2015) to exploratory and confirmatory factor analyses in order to check the psychometric properties of the scale from different and wider perspectives in an attempt to complement the findings of the study done by Saeidi et al. (2015).

PURPOSE OF THE STUDY

To continue and expand the same line of research, the present study seeks to lend P-MIDAS (Saeidi et al., 2015) to exploratory and confirmatory factor analyses to check the psychometric properties of the scale from different and wider perspectives in an attempt to complement the findings of the study done by Saeidi et al. (2015). The following research question was specifically formulated in the present research attempt:

What are the psychometric properties of multiple intelligence developmental assessment Scales (MIDAS) for adults in the Iranian context?

METHOD

The present study drew on exploratory and confirmatory factor analyses in order to check the psychometric properties of MIDAS. The descriptions of the participants, the data collection instruments, and procedures are outlined in this section.

Participants

A total number of 2146 respondents participated in the study. The

participants were at least 19 years old and above (M = 29.40, SD = 2.26) (301 samples did not specify their age). Out of 2146 samples, 1103 females and 1043 were males. Of the participants, 1670 samples (77.8%) were single, 476 samples (22.2%) were married. There was an attempt to select adults across a range of different Iranian ethnic groups (Persian, Turkish, Kurdish, and Arabian), ages, educational levels, socioeconomic groups, and from different provinces. The participants were voluntary and anonymous and some of these participants were given course credit for participating in the study. Demographic variables of the participants are all presented in Table 1.

Table 1: Demographic Variables of the Participants

Variables	***N***	***Educational Levels***		***Provinces***	**N**
Age	Above 19	Under-High School Diploma	298	Tehran	356
Mean	29.40	High School Diploma	596	Fars	241
SD	2.26	Bachelor	757	Khozestan	304
		Master	365	Isfahan	271
		PhD	130	Golestan	280
				Semnan	512
				Azarbaijan (East and West)	182
				Kordestan	
Total					2146

Instrumentation

In this study, the instrument used is MIDAS adopted from Shearer (1994), which was developed in English language. To measure individuals' MI, the MIDAS questionnaire was used, consisting of 119 items. The questions cover eight areas of abilities, interests, skills and activities. The scale is a six point Likert scale ranging from 0 to 5 as follows: "never" was given a value

of 0, "sometimes" a value of 1, "often" a value of 2, "almost all the time" a value of 3, "always" a value of 4, and "I don't know" a value of 5. The MIDAS questionnaire has been completed by approximately 10,000 people world-wide. Alpha reliability of the profile scores based on the MIDAS turned out to be as follows: Musical: .70, Kinesthetic: .76, Logical-Mathematical: .73, Spatial: .67, Linguistic: .85, Interpersonal: .82, Intrapersonal: .78 and Naturalist: .82 (Shearer, 1996). Due to the word limit the full validated questionnaire is available upon request.

Data Collection Procedure

Data collection took place from March 2015 to July 2016. The participants had to be above 19 years old. At first, one of the researchers contacted the Welfare Organization, Educational organization, mostly universities and private institutes for approval and the selection of schools and universities to be covered. To ensure an unbiased sample, participants were selected randomly from different sectors. Regarding students, meetings with the teachers were held in order to gain the permission for their students' participation at the end of the class, and a letter of consent was received. Participants completed the Personal Information Form and MIDAS. The instrument administration was done by direct distribution of the questionnaire and the participants were given 30-35 minutes to answer the questions. To receive reliable data, the purpose of completing the questionnaires was explained to the participants, and they were assured that endeavour would be made to observe the confidentiality and anonymity considerations. A cross-sectional design was used in this study.

Data Analysis

Statistical data analysis was performed using the SPSS (version 22) and EQS (version 6.3) (Structural Equation Modeling Software). The data saved in SPSS file was transformed to text file to determine the exploratory factor analysis and reliability of MIDAS scale and the eight subscales using EQS.

Before the analysis, accuracy of all data was examined and missing values were identified. Seventy invalid questionnaires were detected and eliminated.

RESULTS

Research Question

Exploratory factor analysis (EFA) was used to establish the construct validity of the instrument by performing principal components analysis (PCA) with varimax rotation. The suitability of the factor analysis was evaluated using the Kaiser–Meyer–Olkin (KMO) measure, Bartlett's test, a scree plot and the Kaiser eigenvalues-greater-than-one rule. Moreover, items were excluded if they met the following criteria: item-total correlation <0·3, factor loading <0·5 on one factor, item loading exhibiting a similar value on two factors, absolute value of skewness >2, and absolute value of kurtosis >2.

Confirmatory factor analysis (CFA) was performed to assess the structural model fit of the MIDAS (Table 2). In order to evaluate the fit of the models, the following analyses were performed: The chi-square, Incremental Fit Index (IFI; Bollen, 1989) ≥ .90, Normalized Fit Index (NFI; Marsh, Balla, & McDonald, 1988) ≥ .80, Non-normalized Fit Index (NNFI; Bentler & Bonett, 1980) ≥ .90, Comparative Fit Index (CFI; Bentler, 1990) ≥ .90, Goodness-of-fit Index (GFI; Jöreskog & Sörbom, 1988; Marsh et al., 1988) ≥ .85, Adjusted Goodness-of fit Index (AGFI; Marsh et al., 1988) ≥ .80 Standardized Root Mean Square of Errors < .1 (SRMR; Marsh, Balla, & McDonald, 1988), and Root Mean Square Error Approximation (RMSEA; Steiger, 1990) < .06.10.The fit was acceptable if the CFI, AGFI, RFI, and NFI ≧ ·90 and RMSEA <·06 (Hair et al., 2010).

Table 2: Summary of Model-Fit Statistics of the Confirmatory Factor Analysis

Mod	X^2	d	X^2/	p-	CFI	IF	GFI	AG	SRM	RMSE	RMSE

el		f	df	valu e		I		FI	R	A	A %90 CI
Bilev el Mod el	172.3 4	4 8	2.06	(p < 0 .001)	1.00 0	.9 3	1.00 0	.91	.035	.032	.04

Descriptive analysis was used to describe the demographic data. The internal consistency of the MIDAS was determined by using Cronbach's α coefficient which was equal to .82.

Cultural Adaptation of Instrument

The Persian version of the culturally adapted MIDAS-adult was well accepted as Saeidi et al. (2015) reported; the results of this study generally found the MIDAS clear and easy to understand. Thus, the adapted questionnaire was used in the subsequent validation study without any further revisions. The items and subscales in original MIDAS are shown in Table 3.

Table 3: The Items and Subscales in Original MIDAS

	MUS	KIN	LOG	SPA	LIN	INTE	INTR	NAT
N. of Items in Each Subscale	14	13	17	15	20	18	9	13

Item Analysis

Item analysis revealed that the corrected item total correlation validity index was > 0.2, and that there were no negative correlations or non-correlations. This indicated that each item in the MIDAS had a satisfactory degree of discrimination.

Exploratory Factor Analysis

An exploratory analysis identified nine factors with an eigenvalue greater

than 1; as the screen plot indicates, it was observed that a solution with eight factors would be appropriate (Figure 1).

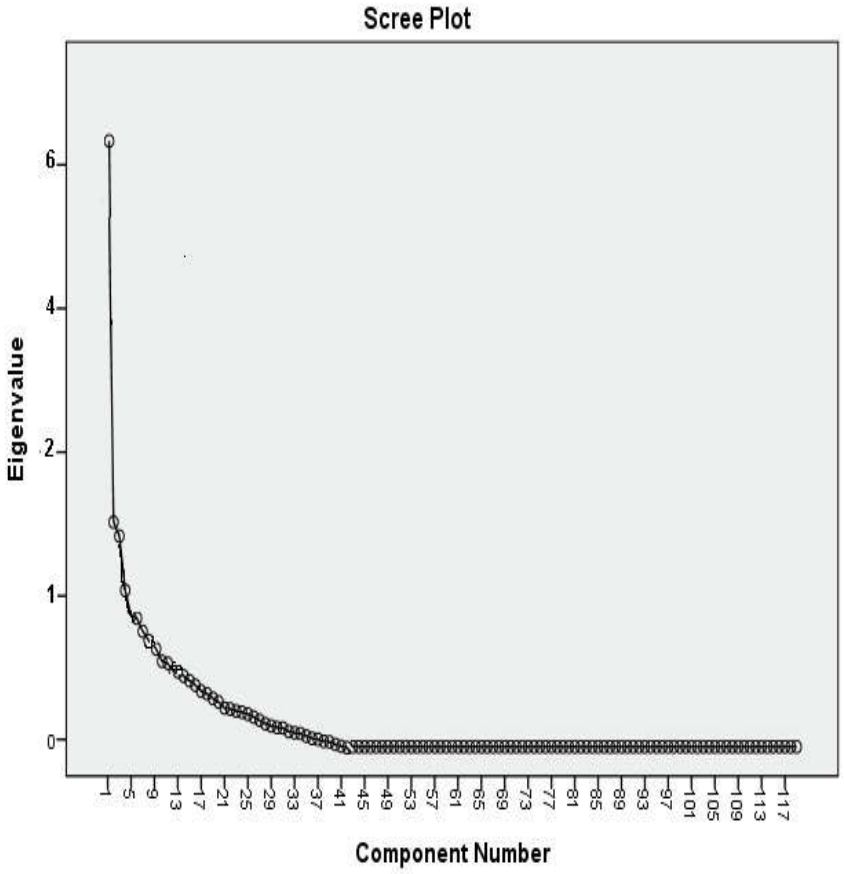

***Figure 1*:** Scree-plot graphic for the Persian version of the MIDAS-adults

This eight-factor solution showed good sampling adequacy indexes (Kaiser-Meyer-Olkin 0.94; Barlett sphericity $p<0.005$), explained 63% of the variance, and was comparable to the analysis of the original English version. Some differences between the Persian MIDS and the English version in the allocation of items after Varimax rotation were observed (Table 4).

Table 4: Results of the Exploratory Factor Analysis Leading to MIDAS-adults with 119 Items

	Component– Factor							
	MUS	**KIN**	**LOG**	**SAP**	**LIN**	**INTE**	**INTR**	**NAT**
MUS1	**.687**		.207					
MUS2	**.658**							
MUS4	**.601**	.388						
MUS5	**.624**							
MUS6	**.563**							
MUS7	**.593**							
MUS8	**.530**							
MUS9	**.523**		.232					
MUS11	**.533**							
MUS13	**.465**						.350	
MUS14	**.535**							
KIN15		**.632**						.298
KIN16		**.509**						
KIN17		**.590**						
KIN18		**.679**						
KIN20		**.617**						
KIN21		**.491**						
KIN22		**.631**						
KIN23		**.509**						
KIN24		**.500**				.301		
KIN126		**.524**						.225
KIN127		**.586**						
LOG29			**.511**					
LOG31			**.622**					
LOG32			**.415**		.232			
LOG33			**.435**					
LOG34			**.622**					
LOG36			**.532**					
LOG37			**.429**					.371
LOG38			**.540**					
LOG39			**.594**					
LOG40	.333		**.427**				.254	
LOG41			**.455**					
LOG42			**.479**					
LOG43			**.470**					
LOG44			**.433**					
SPA45				**.521**				
SPA46	.217			**.552**				
SPA47				**.515**				
SPA48				**.472**				.239

SPA49			**.482**				
SPA51			**.548**				
SPA52		.300	**439**				
SPA53			**.557**				
SPA54			**.623**				
SPA55			**.571**			.325	
SPA56			**.568**				
SPA57			**.443**				
SPA58			**.479**				
SPA59			**.548**				
LIN60				**.533**			
LIN61				**.610**			
LIN62				**.684**			
LIN63				**.556**			
LIN65				**.457**			
LIN66				**.422**			
LIN67				**.462**			
LIN68				**.568**			
LIN69				**.578**			
LIN70		.309		**.551**			
LIN71				**.610**			
LIN72			**.232**	**.524**			
LIN74				**.545**			
LIN75				**.506**			.345
LIN76	.219			**.558**			
LIN78				**.487**			
LIN79				**.568**			
INTE80					**.461**		
INTE81	.267				**.477**		
INTE82					**.537**		
INTE83					**.453**		
INTE84					**.640**		
INTE85					**.462**		
INTE86					**.510**		
INTE87					**.504**		
INTE89					**.661**		
INTE90					**.486**		
INTE91					**.419**		
INTE92			.351		**.697**		
INTE93					**.538**		.306
INTE94					**.453**		
INTE95					**.545**		
INTE97					**.475**		

INTR98			**.265**	**.503**	
INTR99				**.497**	
INTR100				**.410**	
INTR101				**.544**	
INTR102				**.671**	
INTR104				**.591**	
INTR105				**.496**	
INTR106				**.483**	
NAT107					**.441**
NAT108					**.491**
NAT109		.241			**.469**
NAT110					**.420**
NAT111					**.488**
NAT112					**.438**
NAT113					**.467**
NAT114					**.556**
NAT115					**.606**
NAT116	.202				**.414**
NAT117					**.452**
NAT118					**.575**
NAT119					**.500**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. A Rotation converged in 9 iterations. **Factor Abbreviations**: MUS=Musical; KIN=Kinesthetic; LOG=Logical-math; SPA=Spatial; LIN= Linguistic; INTE=Interpersonal; INTR=Intrapersonal; NAT=Naturalist.

Note: All factor loadings >.40 are shown. Items are listed by number and expected highest scale loading.

The following points relate the items loaded significantly in each of the MI constructs to the Persian Sample: An examination of the content of the items loaded highly factor shows that only 104 out of 119 items are found to load predominantly on factors. Factor loadings are generally considered to be meaningful when they exceed .30 or .40 (Floyd & Widaman, 1995). We considered factor loadings of at least 0.40 appropriate. The factors contains 104 items that load greater than 0.40. Thus, most of the original items load significantly. It is noted that 24 of items (item 1,4 ,13,15,24,26,32,37,40,46,48,52,55,70,72,75,76,81,92,93,109, and 116) are also loaded on other factors. These exploratory factor analyses results provide a strong match with the scale structure predicted for the MIDAS items.

Confirmatory Factor Analyses (CFA)

Confirmatory factor analyses were specified and estimated using EQS 6.3. According to Bentler (2006), EQS provides researchers and statisticians with a simple method for conducting the full range of structural equations models including multiple regression, multivariate regression, confirmatory factor analysis, structured means analysis, path analysis, and multiple population comparisons. A covariance matrix was computed using the 104 items of the Persian MIDAS and model parameters estimated using maximum-likelihood method. All factors were allowed to correlate and no correlated errors were included in the estimation models. The results supported the one-factor structure of the MIDAS, whereas the indices exceeded the appropriate limits for the goodness of fit. Specifically, the CFA indices of the MIDAS were χ 2=172.34, df 4830, CFI = 1.000, IFI =.93, GFI= 1.000, SRMR= .035, the root mean square error of approximation (RMSEA) was .032, which was in line with the rest of the indices. The NNFI indicates that the 8-factor model has a 95% improvement in fit over a null model. The item loadings were acceptable and ranged from.44 to .96 (Figure 2). The average off-diagonal standardized residual was.028 and supported the good fit of the model. To further test the robustness of the 8-factor solution, a series of multi-sample exploratory factor analyses were also conducted for different age groups. The resulting maximum likelihood solutions for each age group were virtually identical.

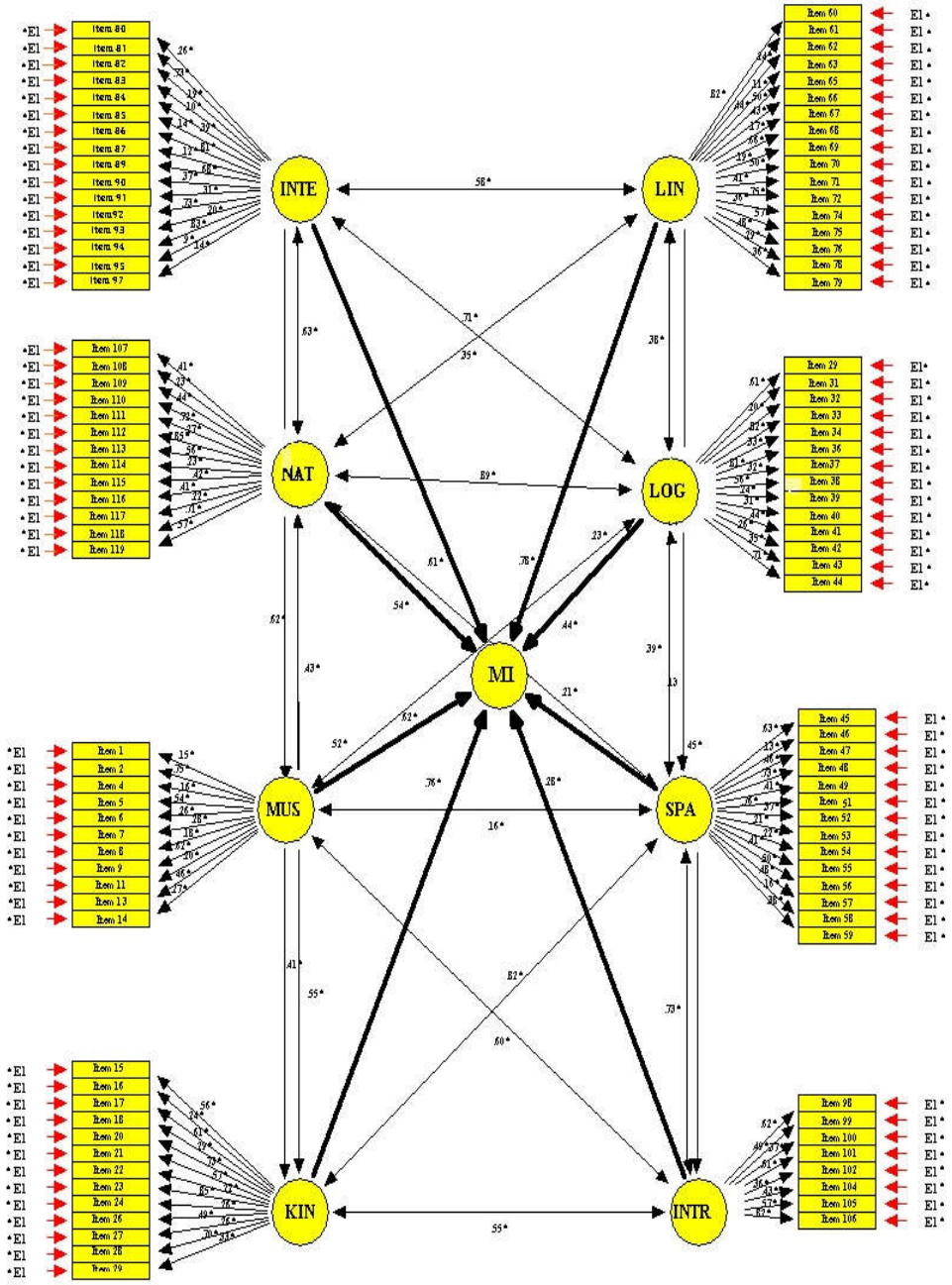

Figure 2. Factor loadings for the Persian version of the MIDAS

Reliability

The mean, standard deviation, skewness, kurtosis, and reliability coefficients, for each of the measured subscales in this study are reported in Table 5. The reliability estimate for the entire test was acceptable (0.92), signifying a high degree of homogeneity among the 119 items. For the current study (see Table 5), the alpha coefficients were as follows: 0.92 for INTE, .91 for INTR, .90 for SPA, .93 for LIN, 0.89 for LOG, .91 for KIN, .90 MUS, and .92 for NAT. The skewness and kurtosis values were examined to establish if the subscales met the assumptions of normality (e.g., expected range should be between -1.00 to 1.00).

Table 5: The Means, Standard Deviations, Reliability Coefficients, Skewness, Kurtosis for the MIDAS Subscales

Subscale	M	S.D	α	Skewness	Kurtosis
Interpersonal	48.02	16	.92	.41	.61
Intrapersonal	51.91	15	.91	.69	.53
Spatial	55.83	16	.90	.46	.29
Linguistic	42.13	17	.93	-.51	.31
Math-logical	50.82	17	.89	.44	.66
Kinesthetic	52.31	18	.91	.50	.34
Musical	54.48	21	.90	-.40	.28
Naturalist	43.90	18	.92	.51	.19
Total	48.34	21	.92	.61	.41

The correlation matrix among the MIDAS subscales is presented in Table 6.

Table 6: Correlation Matrix among the MIDAS Subscales

Subscale	1.INTE	2.INTR	3.SPA	4.LIN	5.LOG	6.KIN	7.MUS	8.NAT
1.Interpersonal	__							
2.Intrapersonal	.69**	__						
3.Spatial	.54**	.29**	__					
4.Linguistic	.71**	.41**	.62**	__				
5.Math-logical	.45**	.53**	.31**	.41**	__			
6.Kinesthetic	.71**	.39**	.47**	.21**	.30**	__		
7.Musical	.37**	.61**	.26**	.23**	.72**	.82**	__	
8.Naturalist	.49**	.44**	.18**	.49**	.39**	.43**	.50**	__

DISCUSSION

Multiple intelligences (MI) are cognitive constructs (Gardner, 1983) that aroused the interest of Latin American Psychologists (LAP) and educators for their theoretical and practical value for the explanation, prediction, and analysis of behaviors that are present in the Multiple intelligences (Tovar, Díaz, & Salas-Blas, 2018). Based on the conceptual framework of Gardner's (1983) theory of multiple intelligences, MIDAS created for use in MI. In 2012, the instrument was psychometrically adapted for use with adults and teenagers. Within this framework, MIDAS has been found to possess adequate reliability and validity as a self-report measure of a person's multiple intelligences disposition. It is useful for increasing self-awareness, especially regarding skills and abilities. In the fields of psychology and measurement, two psychometric properties of tests, namely validity and reliability, are established as requirements for validating a theory of intelligence (Bachman, 1990).

In light of a recent review of the measurement properties of the commonly used MIDAS, it was prudent to establish the construct validity of this instrument using a confirmatory method as opposed to previously employed exploratory techniques (Shearer, 1997). In support of such claims, regarding the importance of examining validity and reliability measures in developing and adapting measurement scales, the present study aimed to examine the psychometric properties of Persian-MIDAS-adults developed by Saeidi et al. (2015), who translated MIDAS from its source language, English, to Persian language and then determined content validity and reliability of the scale on the Persian sample.

The results of their data analyses indicated that P-MIDAS enjoyed high Cronbach alpha reliability, and significant consistency was reflected in the test items-total score correlations. Such results confirmed that the processes of linguistic validation and translation had been carried out properly, and the validation process employed on MIDAS had been culturally appropriate in the context of Iran. Consequently, it was claimed

that the Persian version of MIDAS can be used to examine MI for Iranian adult population. As the continuation of the same line of research initiated by Saeidi et al. (2015), in this study, the factor structure of MIDAS-adults, developed by shearer (1996, 2006), was examined via EFA and CFA. The results of the present study demonstrated that MIDAS-adults was successfully adapted for use in the Iranian context. Moreover, the results provided support for the multidimensionality of MIDAS across translations and cultures in Persian language.

To more elaborate on the processes carried out in this study, it should be mentioned that the testing of P-MIDAS involved 2146 adults, a number that can be regarded as satisfactory for a pre-final test in order to examine EFA, CFA, corrected item-total correlations, and Cronbach alpha reliability coefficients of the Persian scale. Almost 96% of the samples completed the questionnaire. Seventy of the samples left the form uncompleted and particular questions were unanswered. The samples have not any problems in understanding the instructions on how to fill in the questionnaire. As Saeidi et al. (2015) reported, after translation of the test, construct validity of the scale was examined by expert judgment and pilot study, and the findings indicated that the content of the P-MIDAS needs to be modified to match the Persian content, according to which certain modifications in terms of wordings were applied.

To shed more light, the item analyses in the present study displayed that the items distinguished the persons sufficiently in terms of relevant features of the item. The EFA stage was carried out for determining the construct validity of the scale by performing PCA through varimax rotation. The outcomes of EFA revealed that item loadings for eight principle factors, representing musical, linguistic, naturalist, logical-mathematical, intrapersonal, bodily kinesthetic, interpersonal, and spatial intelligences accounted for 67.21% of the variance for 115 items, showing that the results were fairly robust. As the next stage, CFA was performed to examine the structural model fit of P-MIDAS. Factorial validity results shows that all the subscale results are greater than .40, it means MIDAS had acceptable

factorial validity. Besides, the results indicated that the confirmatory analysis generally replicated the original conceptualization of the MIDAS as the factorial model of eight factors of MIDAS was at an acceptable degree of goodness of fit for the Iranian population.

As a whole, the results of factor analysis revealed that the questionnaire measures eight hypothetical constructs proposed formerly by Shearer (1996). Furthermore, reliability is an important yet often overlooked attribute of assessments intended for research, classroom, and clinical applications (Visser, Ashton, & Vernon 2006). In this study, Cronbach alpha reliability coefficient was used to determine internal consistency of the scale. The outcomes revealed that the internal consistency coefficient reported for the P-MIDAS scale (i.e., $\alpha = .92$; ranging from 0.89 to 0.93) was very high. It is claimed that Cronbach alpha reliability coefficients of greater than .70 are considered as acceptable (Kline, 1998). All in all, the examination and adaptation of the items revealed that the items are matching with the Persian culture, which enables the Persian educators to use P-MIDAS in measuring students' MI in any Persian states.

The need to develop a scale appropriately measuring MI in the context of Iran is highly needed due to two significant reasons. First of all, in order to better appreciate various capabilities of individuals, any culture including Iran requires well validated or adapted MI scales so as to be used by teachers, researchers, and counselors in order to measure individuals' MI levels in a culturally appropriate way (Saeedi et al., 2015). Second, due to the dearth of Persian MI scales enjoying acceptable psychometric properties, many people in the country use self-made MI instruments without going through proper validity and reliability steps, or they may employ well designed MI scales which are developed in other cultures for populations different from the Iranian one (e.g., Ahmadian & Ghasemi, 2017; Tahriri & Yamini, 2010; Pishghadam & Moafian, 2008; Saeidi, 2009). Therefore, the present study and that of Saeidi et al. (2015) are considered as steps taken toward solving this issue by adapting and validating the MIDAS scale for the Iranian Adult population.

CONCLUSION AND IMPLICATIONS

The MIDAS instrument can be implemented for a number of reasons within the general educational context, in general and ELT context, in particular by school administrators, researchers, counselors, and ELT teachers among others as the scale is capable of revealing good amount of information about an individual's intellectual ability levels. The applicability of the scale is due to the significance of MI in the educational context as it can be used to diagnose student's weaknesses and strengths in order to better devise school curricula, classroom instructions, and learning approaches which are more in line with learners' various capacities (Austin, 2016; Johnson & White, 2002; Suprapto et al., 2017). Furthermore, through employing P-MIDAS, teachers can make more informed decisions in the way toward individualized instruction as the scale demonstrates various types of intelligences which individuals can possess, influencing the preferred way through which they may tend to receive instruction. Furthermore, the scale can be applied as an assessment tool for children entering early education. When from the beginning of the children's educational journey parents and teachers are informed of where students interests, priorities, and capabilities reside, they can better lead them toward achieving their desired goals within the academic or vocational stream that children themselves prefer.

This study and that of Saeidi et al. (2015) only focused on one of the versions of MIDAS that is, MIDAS for adults consisting of 119-items. Future studies can go through similar validity and reliability processes for appropriately adapting other versions of MIDAS, such as Teen-MIDAS, MIDAS-KIDS, and MIDAS Child versions (Gardner, 1993) within the context of Iran. Furthermore, the sample considered in this study was selected in a way so as to represent the Iranian adult population as accurately as possible. To this end, the participants were chosen from 9 provinces from north, west, east, and south of Iran, and they were from various age, educational, ethnic, and socioeconomic groups as we

recognized the limitations of generalization when the sample does not sufficiently represent the target population. We recommend that additional CFAs be conducted to further test the MIDAS psychometric properties and theoretical frameworks across different samples in Iran. Additionally, construct validity studies are also needed to compare the scales to other external constructs or instruments. It should be noted that the P-MIDAS measure demonstrated good psychometric properties with satisfactory content and construct validities as well as good internal consistency within adult population in Iran. All in all, practitioners and users of the MIDAS should be aware that this instrument, like many others used in the human resource development arena is based on self-report data.

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