

Investigating of Internal Consistency and Confirmatory Factor Analysis of Prospective and Retrospective Memory in an Iranian Sample

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Objectives: The Prospective and Retrospective Memory Questionnaire (PRMQ) developed by Smith (2000) and consists of a series of questions about memory weakness that can be encountered anyone in everyday life. The self-reported questionnaire has 16 items that assessing of prospective and retrospective memory problems in everyday life and the aim of the present research was to examine the investigating of reliability and confirmatory factor analysis in sample of Iranian students. **Method:** The method of this study was standardization. The questionnaire translated into Persian, and its final form was carried out on 500 subjects who were selected by available sampling among students of Tehran University. To determine the reliability and validity of questionnaire, Cronbach's alpha test and Confirmatory Factor Analysis were used. **Results:** The range of Cronbach's alpha for PRMQ (subscales Prospective and Retrospective Memory) was from 0.64 through 0.73, and the Cronbach's alpha for total PRMQ was 0.80. Confirmatory factor analysis by the maximum likelihood values showed that the Eigen value of four factors was considered that generally explained 28.29% of the total variance. **Discussion:** The Prospective and Retrospective Memory Questionnaire has satisfactory reliability and validity in the sample of Iranian students.

Keywords: Prospective Memory, Retrospective Memory, Confirmatory Factor, standardization

Memory is not a unified concept and the memory systems are different in code operating, storage and retrieval of information. Human memory is a multi-gene attribute/quality, lies under the effect of genetic and environmental factors, that is the provider of persistence and coherent image of the past, that takes in to consideration the present experiences in the future (Kandel, 2006; Dangez et al. 2012). We have focused on investigation about two types of "prospective and retrospective memories" in this study. The prospective memory is the recalling of performing some tasks in appropriate time or in response to an appropriate sign related to the important part of daily life; that is the outcome of remembering the information of the past. On the other hand, retrospective memory is related to

what should be recalled. Therefore, the prospective memory is not fully independent of retrospective memory and the failure of it may have different consequences such as health related problems (not recalling the medicine consumption or not visiting the doctor) (Dobbs and Rule, 1987; Crawford et al, 2003, 2006; Kliegel et al., 2008).

Therefore, in contrast with retrospective memory that refers to a set of past events, the prospective memory is in relation with our future goals. Our ability to recall the works performance has significant applications in everyday performance, as indicated by Salthouse, Berish and Siedlecki (2004), the prospective memory may be a very important determinant for our ability of independent life in relation to the retrospective memory. In addition, Baddeley (1990) has also referred that when a person complains of memory weakness, he/she usually refers to the failure in an aspect of memory. Therefore, it is surprising that

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the prospective memory has relatively been ignored in the literature related to memory and most research works study the retrospective events in place of focusing on memory. This matter is at least the reflection of the fact that successfully performing of a prospective memory task not only needs the remembrance of something that is to be performed in the future, but the retrieval of that thing needs to be performed and this component obviously indicates the role of retrospective memory (Crawford et al., 2006).

Several researchers have claimed that two types of memories do not possess independent structures from each other (Burgess & Shallice, 1997). Although there is an obvious overlap between two structures, many of the researches have indicated that an important distinction exists between the two (Crawford et al., 2006). For example, Henry, Macleod, Philips and Crawford (2004) have expressed in an ultra-analytical revision that aged participants had significantly weaker performance in retrospective memory tests as compared with the prospective memory that is the indicative of influencing of two structures by the age (factor). Wilkins and Baddeley (1987) reported that the individuals who had the higher performance in the test related to retrospective memory (in comparison with those who had weaker performance in this test), have indicated weaker accuracy in duty performing of prospective memory.

Several researches have dealt with the study of varied factors' effect on these two structures. For instance, Heffernan et al. (2010) indicated that smoking may lead to defect development, in prospective memory. In addition, in another study carried out by Heffernan and O'Neill (2012), they had engaged in the comparative study between drinkers and common individuals, and indicated that these individuals have had the weaker performance of prospective memory.

An access way to the insight for differentiating between prospective memory and retrospective memory in everyday life of individuals is the use of self-rating questionnaires. Smith (2000) has indicated that the previous researches which had engaged in the study of memory ability, using the self-reporting forms, have ignored the differentiation between prospective memory and retrospective memory. For example, the questionnaire related to cognitive failure (Broadbent, Cooper, Fitzgerald and Parkes, 1982) refers only to 2 items out of 25 items of prospective memory. In addition, the questionnaire related to everyday memory developed and designed by Sunderland, Harris and Beddely (1988, 1984), only studies, 3 items out of 28 items related to prospective memory.

In order to study the admissibility of self-reporting form related to prospective and retrospective memories' questionnaire, Crawford, Smith, Maylor,

Della Sala and Logie (2003) studied the data aggregated by general adult population (n=551) using factorial analysis that are placed in best form into two factors. In addition, they indicated that the validity of whole test and its sub-scales included the prospective and retrospective memories, respectively, equal with 0.80, 0.84 and 0.89. Crawford has provided the forms in T shape for each test scale during 2003. Therefore, considering the mentioned researches, the questionnaire of prospective and retrospective memories has validity and admissibility of necessary construct to apply in clinical sets.

There are several evidences that indicate, the questionnaire of prospective and retrospective memories have applications (for instance: Heffernan, O'Neill, 2012; Livner et al, 2009; Sham et al, 2011; Kattelerand Graf, 2007; Glaster et al, 2008 and Dangz et al, 2012). Therefore, considering the absence of investigating in psychometric attributes and norms finding of this list in its Iranian sample, the present study is an effort to test the psychometric attributes of this questionnaire in a sample related to Iranian students.

Method

Study design

The method used in this research is scale validation. The present time situation and condition are investigated by this method. This research has been conducted as follows.

In stage of questionnaire Translation, The preparation process of questionnaire that has been developed in other culture needs translations and several repeated translations that have been translated to have satisfaction from equality and similarity of basic questionnaires concepts and meanings with questionnaire (Asghari Moghaddam et al., 2008). In this stage, another specialized person who was fully skilled in English translated this instrument in simple and fluent English and editing was also performed on the text, so that, there was no cultural contradiction from conceptual viewpoint of people of our country at final questionnaire. Then the resulted text was translated again to English by an English expert and both of texts were compared.

In the stage of experimental implementation of questionnaire, the questionnaire was distributed and presented to 50 girl and boy students and they were requested to specify the vague and incorrect instances of it and determine the degree of complication. They specified whether questionnaire is well-established and well-shaped, as well as the questions are comprehensible and question numbers are appropriate as well as understandable from composing viewpoint. All mistakes and complicated points were determined and removed at last.

In the fundamental implementation of questionnaire, firstly the University of Tehran was selected as the basic sample/model. Later, the questionnaires were distributed among the students by attending to each class and providing explanations on the questionnaire and the way to respond related questions.

Subjects

The statistical population of present research included all students studying in Tehran University during the academic year of 2011-2012. Among this population, 500 students of Tehran University was selected by using the convenience sampling method as research sample.

Instrument

Smith constructed the description of prospective and retrospective memories questionnaires in 2000. This questionnaire is a set of questions on the problems related to memory weakness that everybody encounters it in his/her everyday life. This self-report questionnaire has 16 items that deals with the assessment of prospective and retrospective memories' problems in everyday life. Half of the test material is completely on prospective memory while the rest concerns to retrospective memory. In addition, the test material has been marked in equal with parts of memory and environment and encompasses short and long term memories. Therefore, although, the initial objective was to develop a self-report scale that evaluates the prospective and retrospective memories systematically, each item can be classified in three dimensions. For example, question number 14, (if tried

to have a contact with a friend or kin and did not succeed in establishing such contact, forget to repeatedly doing so?) has been designed as a question to assess the prospective, long-term and self-marked memories.

In this test, participants are requested to express how such a problem is usually developed for them and they mark it in a scale of 5 points (always, mostly, sometimes, rarely and never). After that, the rating is changed to numerical values of 5 (always) to 1 (never) and the minimum score for each person is 16, while the maximum one can be 80 (Crawford et al, 2003, 2006).

Results

The research sample included 500 students of Tehran University who divided to 246 boy students (48.7%) and 254 girl students (50.3%), 436 participants were unmarried (86.3%) and 54 were married (10.7 percent). 20.2% (102 persons) of the subjects were from human science, 26.7% (135 person) of the students from basic science, 42.0% (212 persons) from technical and engineering subjects, 5.7% (28 persons) under sub medical groups as well as 17 persons (3.4%) were studying in the sub group of art. The statistical internal (Cronbach's alpha coefficient) consistency method was used to assess the reliability of PRMQ and its sub scales. Internal consistency in fact satisfies the average correlation of PRMQ inner question and as much as its rate is higher, it implies on inner higher test homogeneity and sub scales.

Table 1

Descriptive characteristics (mean and standard deviation) and Cronbach's alpha coefficients of prospective and retrospective Memories

Factors	Mean	Standard deviation	Cronbach's alpha
Prospective memory	18.08	4.80	0.64
Retrospective memory	17.09	4.61	0.73
total	35.09	8.50	0.80

The Cronbach's alpha coefficients for the factors PRMQ (subscales prospective and retrospective memory) were 0.64 and 0.73 and the one for the total PRMQ was about 0.80 which indicates high levels of internal consistency for the subscale and total scale for PRMQ.

Table 2

Results of confirmatory factor analysis for prospective and retrospective memory questionnaire

Items	Prospective	Retrospective
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	memory	memory
1	0.577	
2	0.406	
3	0.533	
4	0.564	
5	0.418	
6		0.427
7		0.419
8	0.460	
9	0.358	
10	0.547	
11	0.465	

12	0.498
13	0.491
14	0.502
15	0.641
16	0.172

Factors analysis was used to study the admissibility of the construct and investigate the sub structural factors of the test. In addition, the Cruet Bartlet test was used based on correctness of the matrix of KMO value to study the sufficiency of samples volume and reject the zero assumption. In this study, the KMO value was obtained equal to 0.89 that indicates the sufficiency of under research sample to carry out the factorial analysis. In addition, the X^2 square root value was estimated to be 1441.98 in the test results of Cruet Bartlet that was significant at 0.01 alphalevels.

The analysis of approval factors using the method of maximum likelihood indicated that only two factors are considerable for Eigen value that expresses only 28.29% of general variance, the first factor expresses 15.32% while the second factor expresses 12.96% of the variance.

The results obtained from the rotated matrix of factors were used with Warimex rotation to study the obtained factors conformity in analyzing the factors with two specified scales of test. Table 2 indicates that items of 1, 2, 3, 4, 5, 8, 9, 10, 11 and 16 have been placed on the first factor which has been carried as the subscales of prospective memory. In addition, items of 6, 7, 12, 13, 14 and 15 have been placed on second factor which assesses the retrospective memory in the basic scale.

Discussion

The objective of this research was to study the internal consistency and analyzing the approving factor of prospective and retrospective memory questionnaire in a sample of Iranian students. Cronbach's alpha for PRMQ factors was equal with 0.64, 0.73 and 0.80 (prospective, retrospective and holistic memories) respectively, that indicates the high internal consistency levels for sub scales and the whole questionnaire of PRMQ.

In a research carried out by Crawford et al. (2003), the data aggregated from general population of adults (n=551) was studied by using and approving factorial analysis, and placed well in two factors. They also indicated that the validity of the whole scale and its subscales including the prospective and retrospective memories were 0.80, 0.84 and 0.89 respectively. Therefore, considering the mentioned researches, the questionnaire of prospective and retrospective memories has the validity and admissibility of necessary construct to apply in the clinical groups.

In order to investigate the differential credibility/validity of assessment list in another study, the interpersonal support was implemented along with inclination degree scale; as a whole, there was no correlation in none of the subscales (Kuhn, 1985).

Moreover, Matenjua et al. (2011) carried out a study on 212 persons suffering from HIV in Kenya. The data obtained from this study indicated a Cronbach's alpha 0.90 for ISEL. It can totally be concluded by the findings obtained from this research and further studies carried out on other countries, that the assessment list of interpersonal support enjoys the appropriate psychometric attributes.

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