Normalization of Woodworth Test to Study Emotional Disorder of Adolescents in Tehran

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Abstract: Considering the fact that emotional disorders disturb adolescent's life and absence of reliable tool to measure it in Iran, the necessity to identify and prevent it and create the background for further studies resulted in conducting present study. Therefore, 580 adolescents were selected using multistage random sampling. This is a descriptive and exploratory study. Data were collected using descriptive statistics, Cronbach's alpha, PCA, factor oblique rotation and t-test. then table of percent and categorical norms was created. Results showed the reliability coefficient of tools to be 0.9. After principal components analysis, eight factors were extracted including paranoid thoughts, antisocial behaviors, withdrawal, irritability, depression, aggression, obsession and psychasthenia. The tendency towards these disorders was low in the samples and this low tendency was more prevalent in boys than girls. Results of this study can be used as a useful tool to be used in psychological studies and measure emotional disorders of adolescents in Tehran.

Key words: Emotional disorders, psychometrics, percentage norm, category norm, validity, reliability

INTRODUCTION

It is of significant scientific use to recognize the objectives of non-cognitive aspects of people. These aspects somehow determine mental talent's efficiency and allow description of human behavior in varied life situations. Of these non-cognitive aspects recognition of which is of major importance, are emotions and problems related to them are known as emotional disorders. This term is typically used in education systems to categorize problems observed in children and adolescents. The term "emotion" is employed since it consists of a wide range of feelings that are specified by mental feeling of sadness.

These disorders are mainly treated using social-mental interventions (including cognitive behavioral and psycho family therapy, teaching social skills, individual psychotherapy, relaxation training etc.) and medication. In recent years, many attempts are made to synthesize findings of these studies (Robert and Michael, 2008).

Results of studies conducted in national data center of mental health in 2009 showed that inability in learning is one of emotional disorders. Other impacts include the inability in creating and maintaining satisfying interpersonal relation with peers and teachers, various improper behaviors or emotions in normal conditions, sad mood and fears associated with personal or school problems. Various strategies are available in teaching students with emotional disorders. In this regard,

encouragement and creating a society where all students are respectable is very important and examining student's capacity in making relations is part of these strategies.

Special education in the Netherlands has led to the construction of 15 types of special schools for children with a wide range of disabilities or disorders by separating specialties with the aim of providing support and facilities. The term "emotion" is used since it covers a wide range of feelings. Character recognition clarifies the cause of mental problems and various disorders and how they are developed and manifested in many cases (Ganji, 2000). The necessity to apply scientific methods of personality assessment is no secret and it confirms the need to prepare and develop tests that conform to cultural conditions and the value system of Iran and have reliability and reliability.

Lack of tools with Iranian norms to measure various aspects of behavior is obvious and means required should be provided to remove this shortage. Therefore, preparing and normalization of psychological tests seems to be important. In addition, diagnostic instruments should be considered with Iranian norms in diagnostic works. The general issue in this study is normalization of woodworth personal data sheet on Iran. This test was prepared to measure personality characteristics of those who volunteered to join the army in the US. First, Woodworth used this test known as Psychoneurotic Inventory to identify those soldiers who suffered from war neurotic disorders. Materials and questions of this

test had been selected from the inventory of emotional disorders and questions asked by psychiatrists from patients in diagnostic interviews (Papurt, 1930). In fact, this scale was a written interview created to identify military people suffering from neurotic disorders. Although, this questionnaire was not applied in war, it was used later to create various objective personality tests (Sharifi, 2000). While developing this questionnaire, Woodworth omitted those materials or questions that were answered by over 24% of normal people similar to the keys (answers that showed emotional disorder) (Ganji, 2000). The Woodworth personality questionnaire is employed to measure emotional disorder in adolescents from 12-16 or 17 year of age. On the other hand, disorders disturb person's thought, feeling, mood, ability to connect others and their routine performance. Since, adolescents are considered a valuable material and spiritual capital in every society, their health is considered as an important and essential issue, because they are supposed to build the future of nations. The important issue here is using a reliable scale to diagnose emotional disorder in adolescents to perform required measures for medication in case of diagnosing the disorder. On the other hand, this study addresses feasibility, reliability, validity and normalization of Woodworth test in Iran, since no normalization of woodworth personal data sheet has been conducted in Iran that results in diagnosis of emotional disorders and considering the necessity of a reliable and valid tool to be used by related specialists. It is hoped that this study can meet this need; since applying any test in another culture and language basically requires research and study.

The objectives being followed in this study include providing required background to prepare necessary norm in the country, creating conditions for later studies, providing conditions to diagnose emotional disorders and study whether this test that stems from a culture and value different from Iranian society, can verify its performance and accuracy of infrastructure hypotheses in our society. Although in some studies, it is not suitable or even feasible to predict results of study, in these studies, the important point is that the statement of the problem requires conjecture and inference of a type of solution in the form of question through which the study can be started (Hooman, 2005). In this regard, this study seeks for answers to the following questions:

Is there enough internal coordination among the questions of woodworth personal data sheet? Is woodworth personal data sheet of sufficient reliability and validity? From what factors woodworth personal data sheet is saturated of? Is there a difference between amount of emotional disorders among boys and girls? At

what level is a prevalence of emotional disorders in sample group? What percentage of testes is in norm group, lower than norm or special level group?

MATERIALS AND METHODS

This is a descriptive study in terms of method and an exploratory in terms of type of study. Statistical population in this study was all male and female students from 12-17 years of age studying in middle schools and high schools in Tehran. To determine sample, multistage sampling was used. First, Tehran was divided into 5 sections and one district was selected randomly from each section. Then, a girl and a boy middle school and high school were selected and in school one class were selected randomly. Generally, 624 students were selected and attended the study. Here, the age of subjects was also examined to be inside the range of the study and after excluding those questions with incomplete answer, calculations were conducted on 580 questionnaires.

In addition to giving information to students on the objective of conducting this study, their questions on sections that were not understood were answered in a way not to induce a defined answer to them. In this study, short form of Woodworth personality questionnaire with 76 questions was used. Testee's score was total "Yes" answers to any of personality characteristics and questions related to them. In other words, 1 score was assigned to "Yes" answer and zero score was assigned to "no" answer. In this study data were collected by the author through group performance. To evaluate reliability and validity and norm of Woodworth personality questionnaire, common methods in standardizing tests were employed. Statistical features of scale materials were extracted using common methods in descriptive statistics. To determine internal consistency and reliability coefficient of questionnaire, Cronbach's alpha was used. To examine validity of test and determine whether scale content is saturated of several factors, principal components analytical method was employed. To investigate simple structure of scale, factor oblique rotation and to examine the relation of participation's gender with any of emotional disorders, t-test was employed.

RESULTS AND DISCUSSION

Although, the main examination test is its validity and it gives the most useful, proper and sensible information on test, it is not the main question to be answered; since, the main question refers to reliability which is the required condition for validity of measures (Thorndike, 1996).

Based on calculations conducted, reliability coefficient of terms that constitute the scale of Woodworth personal data sheet is 0.90 according to Cronbach's alpha and states scale adequacy in terms of reliability. In this regard, calculations related to reliability coefficient and study to measure constructs scale can be conducted.

In this study, to obtain test reliability, correlation of each term with test total score and its share in test reliability was calculated. It was observed that all correlation coefficients (between score of each term and total test score) are statistically positive and significant. For correlation matrix of Woodworth scale materials, sampling adequacy index of kmo 0.853 and specific value of Bartlett's test of sphericity was significant at 0.0001. According to Kaiser index value should be >0.6 and correlation index that is the foundation of factor analysis should not be zero in the society (Hooman, 2005). Here, correlation determinant is not zero which suggests that it is possible to calculate inverse matrix and extract factors. Therefore, it can be concluded that conducting factor analysis based on correlation matrix obtained in sample under study is justifiable.

In this study, between variables and obtaining definitions of factors, coefficients of higher than 0.25 are considered important and significant in defining factors and lower coefficients are considered to be zero (random factor). Results from principal components analysis of Woodworth scale show that all 76 terms have factor loading of over 0.25 which suggests that all 76 terms of this scale are important and significant. Eigenvalues of 24 factors were over 1 and common variance between variables in these 24 factors was 57.0% of total variable's variance. Considering the sloping design of this scale diagram, it can be inferred that contribution of first factor in total variance of variables is significant and it is distinct from contribution of other factors and specifies 13.0% of total variance Fig. 1.

Based on results from conducting principal components analysis in Diagram 1, of total terms, 8 factors were extracted and they totally express 31.9% of total variance. The first factor with eigenvalue of 9.88 was 13% of total variance and finally, the eighth factor with eigenvalue of 1.51 justifies 2% of total variance of variables. Eigenvalues of these 8 factors, percentage of percent of variance explanation and cumulative percentage of each one of them are shown in Table 1. As can be seen in Table 2, the highest share is related to terms 58, 35 and 50 and the lowest one is related to terms 15 and 34. To obtain a significant structure from factor loading, extracted factors were transferred to new axis with non-orthogonal angles relative to each other based on common methods and use of oblique rotation. Rotation values are obtained after 38 reiterations. Based on factors

Table 1: Eigenvalues, percent of variance explanation and cumulative percentage of factors of Woodworth scale

Cumulative (%)	Variance (%)	Eigenvalues	Factor
13.0	13.0	9.889	1
18.1	5.1	3.878	2
20.8	2.7	2.074	3
23.4	2.5	1.930	4
25.6	2.3	1.719	5
27.8	2.2	1.645	6
29.9	2.1	1.583	7
31.9	2.0	1.514	8

structure matrix, set of terms that were commonly correlated to a factor and form a subtest are extracted and named as follows based on highest factor loading:

First factor terms: 7, 19, 35, 36, 48, 52, 53, 58, 59 and 61 including paranoid thoughts and behaviors.

Second factor terms: The 2, 3, 5, 8, 9, 10, 20, 21, 33, 38 and 39 including emotionality Third factor: terms 37, 41, 47, 62, 66, 71, 72, 73, 74, 75 and 76 including tendency toward antisocial behaviors. Fourth factor: terms 1, 18, 27, 49, 50, 51, 56, 60, 64 and 67 including tendency toward withdrawal.

Fifth factor terms: The 12, 14, 15, 17, 25, 32, 46 and 65 including restlessness.

Sixth factor terms: The 16, 24, 26, 31, 43, 42, 44, 45, 55 and 57 including tendency toward depression.

Seventh factor terms: The 11, 13, 22, 23, 28, 29, 34, 54, 63, 68, 69 and 70 including tendency toward aggression.

Eighth factor terms: The 4, 6, 30 and 40 including tendency toward obsession and psychasthenia (mental weakness).

Boys and girls were compared in terms of each one of eight factors to obtain amount of emotional disorders in both genders. They were not different in terms of tendency toward restlessness and depression; however they were different in terms of tendency toward paranoid thoughts and behaviors, emotionality, antisocial behaviors, withdrawal, aggression and obsession. In addition, both groups showed significant difference in a general study on emotional disorders.

Terms of Woodworth scale are used based on two categorical scale to recognize that how much each term conforms to emotional disorders in subjects. Table 3 and Fig. 1 shows that it has small strain distribution and this curve is flatter relative to normal distribution. Therefore, amount of prevalence of emotional disorders is low in sample under study.

To interpret scores of each subject it is required to express their raw scores in a scale that provides a general

Table 2: Amount of common materials in scale of emotional disorders by conducting principal components analysis

Term	Communality	Term	Communality	Term	Communality	Term	Communality
1	0.285	20	0.273	39	0.231	58	0.533
2	0.402	21	0.237	40	0.416	59	0.450
3	0.370	22	0.372	41	0.367	60	0.307
4	0.289	23	0.336	42	0.304	61	0.432
5	0.284	24	0.282	43	0.386	62	0.315
6	0.342	25	0.159	44	0.354	63	0.286
7	0.255	26	0.332	45	0.253	64	0.352
8	0.277	27	0.277	46	0.344	65	0.320
9	0.463	28	0.225	47	0.178	66	0.318
10	0.369	29	0.208	48	0.311	67	0.410
11	0.253	30	0.166	49	0.401	68	0.295
12	0.239	31	0.310	50	0.517	69	0.353
13	0.201	32	0.374	51	0.336	70	0.303
14	0.150	33	0.318	52	0.406	71	0.358
15	0.080	34	0.106	53	0.358	72	0.221
16	0.202	35	0.531	54	0.256	73	0.425
17	0.348	36	0.480	55	0.335	74	0.480
18	0.209	37	0.271	56	0.322	75	0.398
19	0.397	38	0.265	57	0.350	76	0.319

Table 3: Statistical properties and frequency distribution of total scores of samples

Val	Freq.	Pct	Cum Pct	Freq.	Mid point
0.01	3.0	0.5	0.5	5.0	0.01
0.03	2.0	0.3	0.9	28.0	0.06
0.04	5.0	0.9	1.7	31.0	0.11
0.05	8.0	1.4	3.1	53.0	0.16
0.07	6.0	1.0	4.1	46.0	0.21
0.08	9.0	1.6	5.7	71.0	0.26
0.09	13.0	2.2	7.9	83.0	0.31
0.11	6.0	1.0	9.0	79.0	0.36
0.12	7.0	1.2	10.2	51.0	0.41
0.13	5.9	11.0	0.0	46.0	0.46
0.14	10.0	1.7	12.8	32.0	0.51
0.16	17.0	2.9	15.7	23.0	0.56
0.17	18.0	3.1	18.8	25.0	0.61
0.18	8.0	1.4	20.2	6.0	0.66
0.20	13.0	2.2	22.4	1.0	0.71
0.21	19.0	3.3	25.7	0.0	0.76
0.22	14.0	2.4	28.0	0.1	
0.24	14.0	2.4	30.0	0.5	
0.25	17.0	2.9	33.0	0.4	
0.26	32.0	5.5	39.0	0.0	
0.28	8.0	1.4	40.0	0.3	
0.29	24.0	4.1	44.0	0.5	
0.30	23.0	4.0	48.0	0.4	
0.32	18.0	3.1	51.0	0.6	
0.33	18.0	3.1	54.0	0.7	
0.34	20.0	3.4	58.0	0.1	
0.36	24.0	4.1	62.0	0.2	
0.37	17.0	2.9	65.0	0.2	
0.38	18.0	3.1	68.0	0.3	
0.39	10.0	1.7	70.0	0.0	
0.41	12.0	2.1	72.0	0.1	
0.42	15.0	2.6	74.0	0.7	
0.43	14.0	2.4	77.0	0.1	
0.45	15.0	2.6	79.0	0.7	
0.46	17.0	2.9	82.0	0.6	
0.47	14.0	2.4	85.0	0.0	
0.49	91.0	0.6	86.0	0.6	
0.50	8.0	14.0	87.0	0.9	
0.51	71.0	0.2	89.0	0.1	
0.53	8.0	1.4	90.0	0.5	
0.54	10.0	1.7	92.0	0.2	

Table 3: Continue

Val	Freq.	Pct	Cum Pct	Freq.	Mid point
0.55	7.0	1.2	93.0	0.4	
0.57	2.0	0.3	93.0	0.8	
0.58	4.0	0.7	94.0	0.5	
0.59	9.0	1.6	96.0	-	-
0.61	2.0	0.3	96.4	-	-
0.62	91.0	1.6	97.9	-	-
0.63	5.0	0.9	98.8	-	-
0.64	2.0	0.3	99.1	-	-
0.67	2.0	0.3	99.5	-	-
0.68	2.0	0.3	99.8	-	-
0.70	1.0	0.2	100.0	-	-
Total	580.0	100.0	-	-	-

Mean = 0.32; SE = 0.01; Median = 0.32; Mode = 0.26; SD = 0.15; Variance = 0.02; Kurtosis = -0.54; SE Kurt = 0.20 = Skewness = 0.16; SE Skew = 0.10; Range = 0.68; Minimum = 0.01; Maximum = 0.70; Sum = 186, 0.99
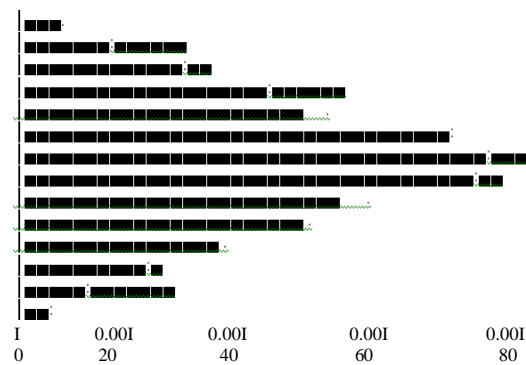

Fig. 1: Statistical properties and frequency distribution of total scores of samples

framework to compare them. Since the nature of scoring in Woodworth scale is based on an absolute system, it seems justifiable to convert scores of this scale to percent and categorical norms and a category that inherently

Table 4: Percent norm related to emotional disorders in total sample group under study

Percentile rank related to each category	Cumulative frequency under middle numbers	Cumulative frequency	Absolute frequency	Scores
3.91	23.0	46	46	1-10
14.96	88.0	130	84	11-20
34.935	205.5	281	151	21-30
58.395	343.5	406	125	31-40
77.96	458.0	510	104	41-50
90.695	533.5	557	47	51-60
96.645	568.5	580	23	61-70

relies on norm groups. Using percent norm, it can be specified what percent of subjects are in a norm group lower than a specified score. This norm is shown in Table 4. Using Table 5 that is related to categorical norm, relative status of subjects can be determined. It means that if a subject's score is in "very high" row, he/she has relatively all characteristics related to emotional disorders. If they were in "high" row, they have most of features related to emotional disorders and if their score is in "relatively high" row, they at least have some features related to emotional disorders. However, if their score was in one of "very low", "low" and "relatively low" sections, it means that features of emotional disorders do not apply in their case.

Woodworth personal data sheet is a test created to measure personality characteristics. To evaluate each one of states mentioned in results section, there were several questions. Woodworth assessed 14 questions on amount of emotionality in his studies. After conducting the present study, there were 11 questions used to assess emotionality and they conformed to Woodworth studies in 6 cases. Subjects, who obtained high scores in these questions, were irritable and showed anxiety reaction against stressful stimuli.

In Woodworth studies, 12 questions were used to determine amount of obsession and mental weakness. In this study, four questions were used for this item of emotional disorders and there were 3 cases that matched Woodworth studies.

Subjects who obtained high scores in these questions, considered as fearful, worried and stressful persons. In Woodworth studies, 15 questions investigated withdrawal. In this study, 10 questions were used for this item and there were 4 cases that matched Woodworth studies. Subjects who obtained high scores in this factor are shy, taciturn and loner persons and they can't communicate others easily.

In Woodworth studies, 18 questions were used to determine the amount of paranoid thoughts and behavior. In this study, 10 questions were used to determine this factor and in 6 cases they matched Woodworth studies. Subjects who obtain high scores in this item are pessimistic and cynical persons and they feel that they are mistreated. In Woodworth studies, 14 questions were used to assess tendency toward depression. In this study, 10 questions were used to assess this factor and

Table 5: Categorical norm related to emotional disorders

Category	Mean	Total scores
Very low	5.50	1-10
Low	15.5	11-20
Relatively low	25.5	21-30
Medium	35.5	31-40
Relatively high	45.5	41-50
High	55.5	51-60
Very high	65.5	61-70

they matched Woodworth studies in 3 cases. Subjects who obtain high scores in this factor may show apathy and impatience in doing their routine work. Slow motions and acts, mental apathy, absurdity and suicidal thoughts isolation and feeling of alienation are characteristics that may be seen in these people. In Woodworth studies, 10 questions assess tendency toward aggression. In this study, 12 questions were used to assess this factor and they matched Woodworth studies in 3 cases. Those who obtained high scores in this factor may easily become angry and react. Their reaction against anger may be verbal in the form of insulting or physical like breaking and damaging objects or attacking others. In Woodworth studies, 7 questions assess tendency toward restlessness in subjects. In this study, 8 questions were used to assess this factor and they matched Woodworth studies in 3 cases. Subjects who obtain high scores in this item are those who suffer from agitation and restlessness because of angst and they always seek to change their environment to reduce their anxiety.

In Woodworth studies 6 questions assessed tendency toward antisocial behaviors. In this study, 11 questions were used to assess this factor and they matched Woodworth studies in 6 cases. Subjects who obtain high scores in this factor may conflict authorities break the laws and show aggressive behaviors. They mostly have superficial relationship with others.

Considering above-mentioned factors, it is shown that woodworth personal data sheet obtained in last stage of study generally covers factors creating emotional disorders with regard to Woodworth views and research history. Since test reliability has been 0.9, it is clear that this test is of adequate reliability. Therefore, results from conducting this test and diagnosis of emotional disorders can be confirmed and therefore, feasibility of this tool is verified by confirming reliability and validity of tools. Woodworth personal data sheet is saturated of 8 factors

that boys and girls were not different in terms of tendency toward depression and restlessness. However, in tendency toward paranoid thoughts and behaviors, emotionality, antisocial behaviors, withdrawal, aggression, and obsession, they were different. General studies show that boys and girls are different in terms of tendency toward emotional disorders.

CONCLUSION

Therefore, separate norms should be prepared for those factors that are different. In this study, since an absolute system forms the nature of scale scoring, this scale provided percent and categorical norms for girl and boy students of Tehran from 12-17 year of age. Findings of study showed that boy and girl students do not have high emotional disorders and these features are not compatible with them. Even, this low tendency toward emotional disorders was lower in boys compared to girls. In girl's sample, restlessness and withdrawal, emotionality and aggression were over average while in boy's group restlessness and withdrawal were over average.

Considering limited population of this study, small sample size and only-student sample that destroy generalizability of findings of study, using Woodworth short from and not observing minimum factor loading, it is suggested to conduct this study in other cities of Iran and use a larger sample size. In addition, using Woodworth long form, considering factor loading, localization the last and providing norms for other countries are among cases suggested for further studies. In general, findings of this study can be used to measure emotional disorders in students of Tehran from 12-17 years of age as a useful tool in psychological and psychometric studies.

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