

Psychometric Properties of the Magical Ideation Scale in High School Adolescents

Zekeriya Cam¹,
Sedef Seydoogullari²,
Muge Artar³

¹Research Assist., ³Assoc. Prof. Dr., Ankara University
Faculty of Educational Sciences Department of
Psychological Services in Education, Ankara - Turkey
²Psychological Counselor, Cahit Elginkan Anatolian
High School, Kocaeli - Turkey

ABSTRACT

Psychometric properties of the magical ideation scale in high school adolescents

Objective: The validity and reliability studies of the Magical Ideation Scale (MIS) have already been conducted among university students. The purpose of this study was to define the psychometric properties of the MIS among adolescents attending high school.

Method: Four hundred twenty two high school students attending an Anatolian High School and classical high schools within Kocaeli city center during the education year 2011-2012 participated in this research. Among the participants 222 (52.6%) were female and 200 (47.4%) were male. The average age of the students was 15.68±0.67. The participants were administered MIS and Irrational Belief Scale Adolescent Form (IBS-A). For the confirmatory factor analysis and reliability analysis, Cronbach alpha coefficient 27% sub-upper group method was used for the validation of the MIS. For the discriminant validity transaction of the scale, the correlation value was calculated with the IBS-A.

Findings: After the confirmatory factor analysis transaction, Root Mean Square Error of Approximation (RMSEA) was found as 0.039; Non-normed Fit Index (NNFI) was calculated as 0.90; Comparative Fit Index (CFI) was calculated as 0.91; Incremental Fit Index (IFI) was found as 0.91; and Goodness of Fit Index (GFI) was found as 0.90. Besides, the internal consistency coefficient was found as $\alpha=0.80$ for female students and $\alpha=0.76$ for male students. In the discriminant validity study, the level of relation between the irrational beliefs and magical ideation was calculated as $r=0.11$.

Conclusion: The validity and reliability analysis findings obtained from the study revealed that the MIS was a valid and reliable scale in measuring the magical ideation. Based on those findings, it may be stated that this scale would be sufficient in the studies to be conducted on the adolescents.

Key words: Confirmatory factor analysis, magical ideation, reliability, validity

ÖZET

Büyüsel düşünce ölçeğinin psikometrik özelliklerinin liseye devam eden ergenlerde incelenmesi

Amaç: Bu araştırmanın amacı, daha önce üniversite öğrencileri ile geçerlilik ve güvenilirlik çalışması yapılan Büyüsel Düşünce Ölçeği'nin (BDÖ) liseye devam eden ergenlerde psikometrik özelliklerini belirlemektir.

Yöntem: Araştırmaya 2011-2012 eğitim öğretim yılında Kocaeli il merkezindeki Anadolu Lisesinde ve genel liselerde öğrenim gören 422 öğrenci katılmıştır. Katılımcıların 222'si (%52.6) kız ve 200'ü (%47.4) erkektir. Katılımcılara BDÖ ve Akılcı Olmayan İnanç Ölçeği Ergen Formu (AOİÖ-EF) uygulanmıştır. Uygulanan ölçeklerin ardından, BDÖ'nin geçerlilik çalışması için doğrulayıcı faktör analizi ve güvenilirlik analizi için Cronbach alfa katsayısı, %27 alt-üst grup yöntemi kullanılmıştır. Ölçeğin ayırt edici geçerlilik işlemi için ise AOİÖ-EF ile korelasyon değeri hesaplanmıştır.

Bulgular: BDÖ için yapılan doğrulayıcı faktör analizi işleminin ardından, Yaklaşık Hataların Ortalama Karekökü=0.039, Normlaştırılmamış Uyum İndeksi=0.90, Karşılaştırmalı Uyum İndeksi=0.91, Artan Uyum İndeksi=0.91 ve Uyum İyiliği İndeksi=0.90 olarak hesaplanmıştır. Ayrıca, ölçek için hesaplanan iç tutarlılık katsayısı ise, kız öğrenciler için $\alpha=0.80$ ve erkekler için $\alpha=0.76$ olarak elde edilmiştir. Ayırt edici geçerlilik çalışmasında da akılcı olmayan inançlar ile büyüsel düşünce arasında $r=0.11$ düzeyinde bir ilişki elde edilmiştir.

Sonuç: Çalışmadan elde edilen geçerlilik ve güvenilirlik analizi bulguları, BDÖ'nin ergenlerde büyüsel düşünceyi ölçmede geçerli ve güvenilir bir ölçek olduğunu ortaya koymuştur. Buna dayanarak, konu ile ilgili olarak ergenlerle yapılacak çalışmalarda bu ölçeğin yeterli olduğu söylenebilir.

Anahtar kelimeler: Doğrulayıcı faktör analizi, büyüsel düşünce, güvenilirlik, geçerlilik



Address reprint requests to / Yazışma adresi:
Research Assist. Zekeriya Cam,
Ankara University Faculty of Educational
Sciences Department of Psychological
Services in Education, 06590,
Ankara - Turkey

Phone / Telefon: +90-312-363-3350/7103

Fax / Faks: +90-312-363-6145

E-mail address / Elektronik posta adresi:
zekeriyacam@gmail.com

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INTRODUCTION

For many years, several researchers have conducted research on irrational thinking styles which are called as magical thinking. It is claimed that magical thinking is a primitive version of ontological thinking which is activated at the time of a danger (1,2). In his book "Totem and Taboo", Freud explained magical thinking from a psychoanalytic perspective for the first time. Freud states that magical thinking reflects peoples' tendency of exposure to non-critical speculative anomalies, which yields creating individual global systems (3).

Magical thinking is believed to be the transmissivity of common limits between psychological/symbolic and physical/material reality. The term magical thinking can be defined as the semi-serious evaluation of events, which do not include causality in real life but can consist of causality in themselves (4). Some examples of magical thinking can be listed as supernatural beliefs, hearing supernatural voices, astrology, telepathy, and believing in the impacts of the spirits (5).

Magical thinking is considered as not only one of the symptoms of schizotypal personality disorders but also an indicator of inclination to schizophrenia (6). Under the same title of "Schizophrenia", while listing the characteristics of human beings with schizotypal personality disorders, World Health Organization's Classification of Mental and Behavioral Disorders (ICD-10) states that people with a schizotypal personality disorder were prone to magical thinking (7). Magical thinking, appearing in the list of the symptoms of schizotypal personality disorders in DSM-IV, is considered as one of the sub-dimensions of schizotypal personality disorders (3).

People's some ritualized behaviors directed researchers to investigate magical thinking from an Obsessive-compulsive disorder (OCD) perspective, which also bears obsessive thoughts and actions. Numerous studies tried to explore above mentioned relationship (1,2,8-10). The results of the studies showed that there was a close relationship between

OCD and magical thinking. Here, magical thinking is the existence of obsessive behaviors about one's own and other's particular fears as well as superstitious beliefs. People with OCD seem to have a high level of paranoia, cognitive illusions, magical thing and thought-action fusion (8).

According to Eckblad and Chapman (6), magical thinking is one's building causality relationships about the conceptions not accepted by the culture around. Atbasoglu et al. (7) mentioned the importance of the subjective side of the experiences. For them, in order to decide whether someone's thought is magical or not, it is necessary to know cultural features of that person. Moulding and Kyrios (9) claimed that the source of magical thinking was the contradiction between willingness of controlling the environment and perceived control. They also support the idea that magical thinking could not be separated from culture and environment. Researchers are also investigating the effects of biological factors on beliefs such as whammy, believing that some things bring luck and thinking that there is a transition of energy among objects (10).

In the early periods of life, some rituals of magical thinking provide children with the thought of control in case of fear and anxiety. Early rituals witnessed around 4 years old were reported to be related to danger and uncertainty anxiety in children. Furthermore, it is stated that magical thinking decreases with age. However, it does not fully disappear (2).

In addition to clinical studies, some psychometric studies were conducted with children and university students in order to investigate magical thinking (4,6,7,11). In these studies, researchers utilized some measurement scales developed to evaluate magical thinking. Bolton et al. (12) developed a 30 item "Magical Thinking Questionnaire Scale" in order to investigate magical thinking in adolescents and children. Another commonly used tool is Eckblad and Chapman's "Magical Ideation Scale". This scale was adapted to Turkish and validity and reliability of the scale were calculated for university students by Atbasoglu et al. (7). One remarkable finding of the study is that the tendency to magical thinking was

higher in males than that of females. The other findings of the study showed that schizotypal features were associated with strength of religiousness, emotional commitment and frequency of religious thoughts in males, while no relation was detected between schizotypal features and religiousness in females.

Co-existence of magical thinking and rational thought in adults is another fact that researchers emphasize. This situation is about the belief that adults can control the events with magical thinking and some other following rituals, when they feel an ambiguity or danger (2). In other words, such kind of belief gives an opportunity to explain and control the ambiguous situations (3).

Although there are numerous magical thinking studies in foreign literature (1,2,5,6), little research was conducted in Turkish context. In one of the studies conducted in Turkey, Yorulmaz et al. (13) investigated magical thinking in OCD. In another study, as mentioned above, Atbasoglu et al. (7) adapted MIS to Turkish with university students. The Turkish version of MIS is the only measurement scale in Turkish literature. There is a need to develop a measurement scale in order to investigate the magical thinking of adolescents in Turkish population.

The main aim of this research is to determine the psychometric features of the MIS in a sample of adults. MIS was developed by Eckblad and Chapman (6) and adapted to Turkish by Atbasoglu et al. (7). Adolescence is known as a period in which complicated and future illations develop. Researchers state that in this period adolescents' reasoning skills make logical problem solving easier (14). Adolescents use this skill in both problem status and during different discussions. This reasoning helps not to accept every view without questioning is an indicator of development of adolescents' cognitive skills (15). In addition to cognitive development, adolescence is defined as a process in which people question rules and values in the society, reject everything that is inimical to rules and values (14).

Just like adults, adolescents have magical

thinking styles like believing in whammy, believing that some numbers bring good luck and some others bring bad luck. This is why it is necessary to investigate magical thinking styles of adolescents. However, there is not a measurement scale to find magical thinking of adolescents. The only scale available in Turkish is for university students therefore studies on adolescents are limited. The validity and reliability of the former adaptation of the scale in Turkish was conducted with university students. Because of the limitations mentioned above we aimed to evaluate the psychometric properties of MIS in high school students which were studied in university students before. Another aim of this study is to develop a scale for future studies on adolescents.

METHOD

Participants

The participants of the research were a total of 422 volunteer high school students who were studying at general and Anatolian High schools located in the city center of Kocaeli in 2011-2012 academic year. There were 222 (52.6%) female and 200 (47.4%) male students. The average age of the participants was 15.68 ± 0.67 . One hundred seventy nine (42.4%) of the participants were General High School students and 243 (52.1%) of them were from Anatolian High Schools. Two hundred two (47.9%) of the participants were 9th grade students and 220 (52.1%) of them were 10th grade students.

Scales

A personal information form, which was developed by researchers in order to find out demographic information of the participants, MIS which was adapted to Turkish by Atbasoglu et al. (7), and The Irrational Beliefs Scale-Adolescent form developed by Turkum et al. (16) were used in the study to collect data.

Magical Ideation Scale (MIS): MIS, developed by Eckblad and Chapman (6), is a 30 item scale, which aimed predicting possible psychotic actions of teenagers. All the items in the scale include true false questions. There are 7 reverse-scored (7,12,13, 16,18,23,24) and 23 straight-scored items in the scale. Hence, high scores of the scale indicate high magical thinking and low scores indicate low magical thinking. Atbasoglu et al. (7) adapted this scale into Turkish, and the Cronbach alpha coefficient of the scale was found 0.78.

The Irrational Beliefs Scale-Adolescent Form (IBS-A): The Irrational Beliefs Scale-Adolescent Form (IBS-A) is a 16 item Likert type scale.. Each item is rated on a 5-point scale; “completely untrue of me” (1 point), “mostly untrue of me” (2 points), “undecided” (3 points) “moderately true for me” (4 points), and “describes me perfectly” (5 points). Split-half correlation coefficient and Cronbach Alpha coefficient of the scale were calculated as a part of reliability studies. Split-half correlation coefficient was found as 0.69 and Cronbach Alpha coefficient was found as 0.70.

Data Collection Procedure

Data was collected only from volunteer participants. The researcher gave information about the aim of the study and the procedure and volunteer students gave written consent. There was not any payment to participants and the data were collected after school hours. The scale was not adapted or translated.

Statistical Analysis

Descriptive statistics of the sample were calculated. As for the MIS Cronbach Alpha Coefficient and item-total correlation coefficients values were calculated via SPSS. In addition, by using LISREL confirmatory factor analysis was conducted in order to find out the psychometric features of the scale for adolescents. The goodness of fit coefficients was calculated with confirmatory factor analysis.

FINDINGS

Reliability and Item Analysis

First, Cronbach alpha coefficient was calculated, and it is found as 0.78. Alpha values were calculated for males and females separately. Alpha level for males was found 0.80 and 0.76 for females. In addition to this, item analysis was run and item-total correlation was calculated. Table 1 shows the item-total correlation values of the scale.

In item analysis process, item-total correlation values of the items were calculated. The analysis showed that the item-total correlation values of 6 items (1,12,13,16,23,24) were below 0.20. As for the item analysis 27% upper and lower group means calculation yielded a statistically significant “t value” [(Upper group=17.87; Lower group=5.48), $t(226)=38.651$; $p<0.01$].

Confirmatory Factor Analysis

By using LISREL programme, a confirmatory factor analysis was run in order to investigate the original form’s one-dimensional structure. In other words, the Magical Ideation Scale for adolescents. After conducting confirmatory factor analysis, goodness of fit indexes (chi-square/df, GFI, CFI, IFI, NNFI and RMSEA) were tested. The chi-square fit statistics were found statistically significant ($\chi^2=666,702$; $df=405$; $\chi^2/df=1.65$). Model fit is considered accepted when the result is ranging less than 5 when chi-square is divided into degree of freedom. If it ranges less than 3, it means that the fit of the model is good (17,18). In addition to this, other model fit indexes are as follows: Root mean square error of approximation (RMSEA)=0.039, Non-normed Fit Index (NNFI)=0.90, Comparative Fit Index (CFI)=0.91, Incremental Fit Index and Goodness of Fit Index (IFI)=0.91. The correlation coefficient of MIS and (IBS-AF) was calculated in order to test the item discrimination of the scale. This analysis yielded a small but statistically significant correlation value ($r=0.11$, $p<0.05$).

The analysis of the confirmatory factor analysis

Table 1: Item total correlation coefficients.

Items	Corrected item total correlation coefficients	Cronbach Alpha's if item deleted	Items	Corrected item total correlation coefficients	Cronbach Alpha's if item deleted
Item 1	0.17	0.77	Item 16	0.08	0.78
Item 2	0.26	0.77	Item 17	0.42	0.76
Item 3	0.25	0.77	Item 18	0.19	0.77
Item 4	0.32	0.77	Item 19	0.35	0.77
Item 5	0.26	0.77	Item 20	0.37	0.76
Item 6	0.24	0.77	Item 21	0.34	0.77
Item 7	0.30	0.77	Item 22	0.32	0.77
Item 8	0.41	0.76	Item 23	0.07	0.78
Item 9	0.32	0.77	Item 24	0.11	0.78
Item 10	0.20	0.77	Item 25	0.39	0.76
Item 11	0.37	0.77	Item 26	0.26	0.77
Item 12	0.19	0.77	Item 27	0.36	0.76
Item 13	0.18	0.77	Item 28	0.27	0.77
Item 14	0.32	0.77	Item 29	0.29	0.77
Item 15	0.41	0.76	Item 30	0.47	0.76

Table 2: Results of confirmatory factor analysis

Items	Standardized Loads	t	R ²	Items	Standardized Loads	t	R ²
Item 1	0.21	3.92	0.08	Item 16	0.06	1.11*	0.03
Item 2	0.30	5.65	0.11	Item 17	0.52	10.37	0.25
Item 3	0.30	5.61	0.13	Item 18	0.22	4.09	0.11
Item 4	0.37	7.11	0.18	Item 19	0.42	8.12	0.20
Item 5	0.29	5.41	0.13	Item 20	0.44	8.51	0.22
Item 6	0.29	5.54	0.10	Item 21	0.39	7.45	0.19
Item 7	0.33	6.34	0.12	Item 22	0.37	7.13	0.18
Item 8	0.47	9.28	0.20	Item 23	0.08	1.42*	0.03
Item 9	0.35	6.66	0.17	Item 24	0.09	1.62*	0.04
Item 10	0.25	4.70	0.12	Item 25	0.45	8.77	0.22
Item 11	0.44	8.56	0.16	Item 26	0.28	5.22	0.12
Item 12	0.19	3.60	0.09	Item 27	0.41	8.04	0.20
Item 13	0.16	3.01	0.08	Item 28	0.30	5.70	0.15
Item 14	0.37	7.07	0.15	Item 29	0.37	7.17	0.17
Item 15	0.46	9.13	0.21	Item 30	0.55	11.19	0.27

*p>0.05, R²: Prediction Coefficients, t: Significant level of parameter values

showed that there were three items, whose t values were not statistically significant. The items (16,23 and 24) were reverse coded items (see Table 2).

DISCUSSION

In this study, the psychometric features of MIS about adolescents in high schools were investigated. There was no scale to measure magical thinking of adolescents in Turkish context. In a previous study reliability and validity tests of the MIS were conducted with university students. This study investigated the

psychometric features of the study in high school adolescents. For this aim, item analyses were conducted by calculating 27% upper and lower group mean differences and Cronbach alpha internal consistency coefficients. A confirmatory factor analysis was also conducted to examine the original form's one-dimensional structure of the scale. The discriminant validity of the scale was tested by calculating correlation coefficients of IBS-AF.

The total alpha value of the scale and the alpha value calculated for males and females separately were shown to be similar with the scale's reliability values of

original English version and the adaptation of the scale's to Turkish university students in reliability analyses of this study (6,7). As a result, it can be concluded that adapted version of MIS for adults and Turkish culture is also a reliable and valid scale for Turkish adolescents. Additionally item-total correlation value of the 6 items was reported to be lower than 0.20 in the Turkish adaptation study. Some other scale development studies in the literature showed that reverse coded item might be under one factor or constitute another factor themselves (19,20). Low correlation values of some items in the scale can be explained by the situation existing in scale development studies. In addition to this, t values of three items (16,23,24) were not statistically significant. In the first study for adaptation to Turkish, it was found that items 16 and 24 worked while item 23 did not work (7). A further analysis of these items shows that these items are reverse coded. However, it can be said that when the contents of the items are investigated, these items were not fully understood by adolescent. As a result, non-significant t values may be the result of reverse coded items.

The Cronbach alpha internal consistency coefficients of the scale in different cultures with different samples were calculated as 0.84 (21), 0.81 (22), 0.87 (23). The reliability coefficients of the scale are close to these values but a little bit lower in the Turkish sample. This may be a result of the features of the sample and culture.

Construct validity of the scale was retested with confirmatory factor analysis. The fit indexes (RMSEA, GFI, CFI, etc.) show that the scale was a valid and reliable one to test magical thinking of adolescents. As a part of confirmatory factor analysis, the value obtained by dividing chi-square to the degree of freedom shows goodness of model fit. If this value is lower than 5, it means that the model is acceptable (17,18). A RMSEA value, lower than 0.10, is sufficient for acceptability of the scale (7). The RMSEA value was 0.039 which provide evidence for the goodness of model fit. The values of NNFI, CFI, IFI and GFI fit indexes were over 0.90, which means that the model fit was good (18). The fit indexes of the scale were: NNFI=0.90, CFI=0.91,

IFI=0.91 and GFI=0.90. These calculations also indicate that model fit is good. In addition to this, it was found that t values of three items were not statistically significant, and the standardized loadings of these items were lower than the others. This may be due to reverse coded items in the scale (19,20). In the first adapted version of the scale to the Turkish, confirmatory factor analysis was not conducted. This shows the necessity of these kinds of studies and by conducting a confirmatory factor analysis we aimed to eliminate this limitation.

A statistically significant relationship ($r=0.11$) between IBS-A (which was used for discriminant validity) and MIS was found. This finding may indicate that magical thinking and irrational beliefs are structurally different from each other. In the literature, the term irrational belief is defined as preventing, self-destructive emotions and thoughts that considerably prevent individuals' life or happiness. What is more, irrational beliefs are thought to prevent socialization of the people (24). Magical thinking, on the other hand, includes supernatural beliefs, hearing supernatural voices, telepathy and believing in the impacts of the spirits (5). Therefore, it can be said that these two ways of thinking are different from each other. Additionally, the investigation of the items in the scales showed that items in IBS-A were different from the items in MIS with regard to contextually. The items in the scale include non-realistic social and individual expectations about life. These points indicate that these two constructs are structurally different from each other. The above mentioned issues might be the results of the low correlation value between the scales.

There are numerous studies that emphasize the role of magical thinking on OCD (26-28). In this regard, it can be said that a measurement scale that investigate magical thinking of adolescents is crucial. As a result, it can be considered that this form of the scale might be useful to evaluate OCD in adolescents.

In addition to the strengths of the study, there were some limitations. First, the data was collected from a non-clinical sample. Second, the implementation of the scale on only high school adolescents might be

considered as another limitation. Third, future studies may conduct this scale with adolescents, who are not studying in high school. Last, there is a need to investigate cognitive processes lying under magical thinking of both adults and adolescents in order to understand this issue from a developmental perspective.

Albeit with these limitations, all of the findings of this study for MIS indicate that the scale is a reliable and valid for adolescents in Turkish sample. However, revising the items after collecting feedback from adolescents might be helpful to reach a more reliable and valid scale for adolescents.

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BÜYÜSEL DÜŞÜNCE ÖLÇEĞİ			
Ölçek Maddeleri		Doğru	Yanlış
1.	Bazı insanlar beni düşündüklerinde o insanların farkına varabiliyorum.	()	()
2.	İnsan olmadığımı dair anlık duygulara kapılıyorum.	()	()
3.	Zaman zaman kaldırım çizgilerine basmaktan korkarım.	()	()
4.	Sanırım, eğer istersem başkalarının düşüncelerini okumayı öğrenebilirim.	()	()
5.	Yıldız falları ve burçlar rastlantsal olamayacak kadar sık doğru çıkıyor.	()	()
6.	Evde kimse olmadığı halde, bazen eve geldiğimde eşyaların yerini değiştirmiş buluyorum.	()	()
7.	13 ve 3 gibi sayıların özel güçleri yoktur.*	()	()
8.	Arasına TV ya da radyo spikeri benim kendisini dinlediğimi biliyormuş gibi aptalca bir hisse kapılmışımdır.	()	()
9.	Başka gezegenlerde yaşayanların dünyadaki olayları etkileyebileceklerini düşündüğüm olmuştur.	()	()
10.	Bilim adamları bize UFO'lar konusundaki gerçeği açıklamıyorlar.	()	()
11.	Eşyaların düzenleniş şekliyle (örneğin bir vitrinde) bana mesajlar verildiği hissine kapılmışımdır.	()	()
12.	Rüyalarımın yalnızca benim aklımın ürünleri olduğundan asla şüphe etmedim.*	()	()
13.	Uğur eşyaları iyi şans getirmez.*	()	()
14.	Kasetlerimde bazen olan bazen olmayan sesler fark ettiğim olmuştur.	()	()
15.	Zaman zaman, tanımadığım insanların, ellerinin hareketleriyle uzaktan beni etkilediklerini hissetmişimdir.	()	()
16.	Olaylar olmadan önce hemen hemen hiç rüyalarını görmem.*	()	()
17.	Bir kişinin yerini bir benzerinin aldığı hissine kapıldığım olmuştur.	()	()
18.	Sadece haklarında kötü düşünerek başkalarına zarar vermek mümkün değildir.*	()	()
19.	Bazen, göremediğim halde etrafımda bir kötülüğün varlığını hissediyorum.	()	()
20.	Bazen, belli insanlar bana dokunduğunda ya da baktığımda enerji kazandığımı ya da kaybettiğimi hissederim.	()	()
21.	Zaman zaman, tanımadığım insanların bana aşık olduğu düşüncesi aklımdan geçmiştir.	()	()
22.	Bazen, aklımdan geçenlerin gerçekte başka birinin düşüncesi olduğu hissine kapılmışımdır.	()	()
23.	Tanımadığım insanlarla tanıştırıldığımda, onları önceden tanımış olabileceğimi düşündüğüm çok seyrek.*	()	()
24.	Olağandışı bazı deneyimlerimi, reenkarnasyon (yeniden hayata dönme) teorisiyle açıklamak olası gözüküyor.*	()	()
25.	İnsanlar sıklıkla öyle garip davranıyorlar ki, insan onların bir deneyin parçası olduklarından şüphe ediyor.	()	()
26.	Zaman zaman, negatif etkileri uzaklaştırmak için belli batıl hareketler yaparım.	()	()
27.	Bir şeyi sadece çok fazla düşünerek, gerçekleşmesine neden olabileceğimi hissetmişimdir.	()	()
28.	Ölülerin ruhlarının yaşayanları etkileyip etkilemediğini merak etmişimdir.	()	()
29.	Bazen bir profesörün konferansının özellikle benim için hazırlandığını hissetmişimdir.	()	()
30.	Zaman zaman, tanımadığım kişilerin düşüncelerini okuduklarını hissetmişimdir.	()	()

*Ters puanlanan maddeler.