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The Development of Paranormal Belief Scale (PBS) for Science Education in the Context of Turkey

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Abstract

Present study aims to translate and develop Paranormal Belief Questions (Rice, 2003) measuring students' non-scientific beliefs which threat science education. Original version of these questions was asked in Southern Focus Poll (1998). 17 questions about paranormal beliefs were administered to 114 university students from different departments. After translating and developing Paranormal Belief Questions into Turkish, factor analysis was conducted and paranormal beliefs were limited in two dimensions as classical paranormal beliefs and religious paranormal beliefs as parallel with original form. Déjà vu item that is not consistent with other paranormal beliefs was removed depending on the factor analysis. The results of the current study enable to differentiate scientific beliefs from non-scientific beliefs of students. By this way, science educators can benefit from this scale.

Key words: Science education, Non-scientific beliefs, Paranormal beliefs, Paranormal experience

Introduction

Paranormal is defined as phenomena that exceed the limits of science (Tobacyk, 1995) or phenomena that is impossible to occur in physics (Irwin, 1993) while paranormal beliefs mean the accepting of those phenomena and believing them (Arslan, 2010). Tobacyk and Milford (1983) identified three criteria to define paranormality: (1) phenomena that cannot be explained by the current science; (2) phenomena can be explained only by major revisions in basic limiting laws of science and (3) phenomena are incompatible with normative perceptions and expectations about reality. Paranormal belief comprise different kinds of beliefs including beliefs in religious doctrine such as powerful deities, power of prayers, survival of soul, and supernatural phenomena, beliefs in psychic abilities such as psychokinesis and extrasensory perception, belief in superstitious, pseudoscience such as astrology, déjà vu and reincarnation, and belief that the earth is visited by the extra-terrestrials life forms (Irwin, 2009). Paranormal beliefs are common in both public and teens, and it doesn't lose its popularity (Harder, 2001). Paranormal beliefs are accepted by people because they give meaning to life. This situation provides some comfort to people and the senseless meaning of life is disappeared by the existence of paranormal beliefs (Schieman, 2010). Another reason why paranormal beliefs are common is inadequate scientific knowledge and understanding of the nature of scientific processes. Increase in paranormal beliefs and its popularity seem to threat for science education because paranormal beliefs both compete with science and decrease the effect of science on public. In the scientific view, any assertion that is not proved by empirical evidence lack credibility and no current scientific knowledge and principles can accommodate paranormal phenomena. Therefore, science and paranormal can be thought antagonistic of each other (Martin & Hansen, 2008; Eder et al., 2010). Hence, in this article, paranormal beliefs are defined as beliefs in power or events that violate basic scientific facts and laws.

Dimensions of Paranormal Beliefs

Paranormal beliefs have been investigated since many years in psychology for the investigation of spirituality (Tobacyk, 2004). A review of literature on paranormal beliefs shows that paranormal beliefs are complex,

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multidimensional and influenced by human experiences and understandings (Clarke, 1991; Sobal & Emmons, 1982; Rice, 2003; Tobacyk & Milford, 1983). In order to understand the multidimensional nature of paranormal beliefs, researchers have categorized paranormal beliefs into factors or dimensions over the decades. In this regard, many measures for paranormal beliefs developed encompass not only parapsychological claims but also all manner of superstitious and magical beliefs: beliefs in religion, supernatural, UFOs, astrology, déjà vu, angels, reincarnation. Sobal and Emmons (1982), for instance, reported three factors: belief in psychic phenomena; religious beliefs and belief in the existence of “other beings” such as monsters and ghosts. Clarke (1991) also defined three factors: traditional religious beliefs; the belief in parapsychology and the belief in extraordinary life forms. Besides, Tobacyk and Milford (1983) suggested greater distinctions for paranormal beliefs. Authors identified seven independent dimensions: traditional religious belief, psi-related belief, witchcraft, spiritualism, superstition, extraordinary life forms, and precognition. In another study, Grimmer and White (1990) yielded seven dimensions: popular science, obscure unbelief, traditional religion, alternative treatments, paratherapies, functional psi, and structural psi.

Another strand of studies has attempted to distinguish paranormal beliefs as religious paranormal beliefs and nonreligious paranormal beliefs or classic paranormal beliefs. Religious paranormal beliefs are associated with religious dogma, such as belief in God and afterlife and classical paranormal beliefs are related to supernatural and superstitions such as belief in ESP, psychic healing and UFOs (Arslan, 2010; Rice, 2003). Hence, researchers have regarded religious beliefs as a dimension of paranormal beliefs. Hergovich et al. (2005) considered religious and classical paranormal beliefs as a belief in the existence of phenomena; such as psi (extrasensory perception), UFOs, or the belief in life after death that currently cannot be explained by science. Gray (1991) argued that both beliefs are paranormal beliefs since they “transcend the explanatory power of mainstream science” (p. 7). Tobacyk and Milford (1983) argued that religious beliefs “originate in the same fundamental human experience and might serve similar functions” as other paranormal beliefs. (p. 1029). However, some scholars claimed that religious beliefs and paranormal beliefs intersect on the grounds that faith in religious beliefs does not require empirical evidences (Stark, 2001; Woolley, 1997). These debates lead researchers across multiple disciplines to devote attention to investigate classical paranormal beliefs (nonreligious paranormal beliefs) and religious beliefs (Emmons & Sobal, 1981; Tobacyk & Milford, 1983; Rice, 2003). For instance, Arslan (2010) reduced Tobacyk and Milford’s (1983) seven dimensions into two dimensions: traditional religious beliefs and classic paranormal beliefs. Other studies investigated the relationship between religious and classic paranormal beliefs to determine whether classical paranormal beliefs become a substitute for or functional alternative to religious beliefs. In this regard, many scholars found negative relationship between both sets of beliefs (Beck & Miller, 2001; Hergovich et al. 2005; Rice, 2003). This inverse relationship between both sets of beliefs suggested that paranormal beliefs should be divided into religious and nonreligious or classic paranormal beliefs.

Research Focused on Paranormal Beliefs

Over the last 30 years, researchers from various disciplines have endeavored to understand the increasing paranormal beliefs among students and public. Despite of increase in scientific information and educational level, there are empirical evidences indicating that considerable number of people believed in paranormal beliefs all around the world. According to 2005 Gallup poll survey, three-fourths of American people believe in at least one paranormal belief. The currently most popular beliefs were extra sensory perception (ESP) (41%), possession by the devil (41%) and ghosts (32 %) among Americans (Moore, 2005). In addition, a survey conducted by the Pew Forum on Religion and Public Life Survey (2009) in America revealed that 25 % of them believe in astrology, 16 % of them believe in evil eye, 18% have ghost experiences and 24 % of them believe in reincarnation. In another study, Rice (2003) examining 1998 Southern Focus Poll data from 1200 adults across nations found that only 10.1 % of the sample was labeled as “skeptics”, %40.2 of the was labeled as “full believers” and rest of them were either traditional religious believers or classic paranormal believers.

Besides, some scholars made comparison among different cultures and nations. Haraldsson and Houtkooper (1996) compared Icelandic and American people’s paranormal beliefs and found that Icelandic people had relatively less paranormal beliefs than U.S. sample except for beliefs in spiritualism. Tobacyk and Pirttilae-Backman (1992) compared students in Finland and America and found that American students had stronger beliefs in traditional religious belief, superstition, witchcraft and extraordinary life forms than Finnish students. However, based on the Finnish Society for Scientific Information (2004) data, one-third of the Finnish students believed in telepathy. In addition, Tobacyk and Tobacyk (1992) compared Polish students and American students and reported that American students hold higher belief in traditional religious beliefs, superstitions and witchcraft. In another study conducted at a British liberal arts college, British students had lower belief in traditional religious beliefs, extraordinary life forms, precognition and superstitions but higher beliefs in

spiritualist belief (Davies, 1988). Moreover, Eder et al. (2010) compared Australian students with Americans and reported that based on the data from Tobacyk and Milford's (1983) findings on Paranormal Belief Scale, Australian students had less paranormal beliefs. 61.4 % of our participants believed that god answers prayers but according to Rice's (2003) data, Americans had stronger belief in that.

In Turkey, there is limited research on paranormal beliefs based on available literature. A survey carried out by Pew Forum (2012) on analysis of the beliefs of Muslim countries and 1501 Turkey citizens participated into this study. According to results, 92 % of them believed in heaven and hell, 63 % of them believed in jinn and 49 % of them believed in magic, and 69 % of them hold superstitious belief such as evil eye. According to another survey conducted by Bilim and Utopya (2001) magazine with 1167 university students studying natural sciences from three cities in Turkey, 71.44 % of them believed in angels and devils, 67.02 % of them believed in Adam and Eve (creationism), 11.7 % of them believed in reincarnation, nearly 30 % of students believed in astrology, nearly 40 % of them believed in telepathy, ESP and UFOs. Only 3.43 % of them do not have any paranormal beliefs. In another study, Ogenler and Yapıcı (2012) analyzed 184 medical students' superstitious beliefs. Authors found that 64 % of them believed in astrology, nearly 20 % of students believed in effect of some particular behaviors on luck and protecting from bad spirits and energy. It was concluded that more than half of the students believed at least one superstitious belief.

In summary, based on the available literature, paranormal beliefs are widespread across nations. Singer and Benassi (1981) stressed that level of paranormal beliefs can be used as an indicator of inadequacy of science education programs. From this perspective, paranormal beliefs violating scientific facts and laws threat scientific literacy, it is essential to identify paranormal beliefs in order to address inadequate and missing parts of our educational system. Even though considerable number of studies in America and Europe exist, there are very few studies examining paranormal beliefs in Turkey. Identifying and understanding those beliefs in different cultural and religious context enables researchers and educators a broader view regarding paranormal beliefs. Hence, the purpose of this study is to translate and develop paranormal belief scale used in Southern Poll (1998) in order to enable researchers and educators to investigate paranormal beliefs in Turkish context.

Method

Participants

The participants of this study were hard science and soft science university students (70 females and 44 males, $\mu = 22.41$ years, S.D. = 3.51 years) from a public university in Ankara, Turkey. Besides, the participants of the study were formed 51 freshmen, 13 sophomores, 7 juniors, 19 seniors and 24 postgraduate students. Data are obtained from various disciplines across the university and majors (chemistry, biology, physics, engineering, sociology and psychology). Students were selected based on convenience sampling method.

Instrument

For the current study, an instrument was used: Paranormal Belief Questions (Rice, 2003) (See Appendix A). Rice (2003) analysis 1998 Southern Focus Poll (SFP), the Institute for Research in Social Science at the University of North Carolina conducts twice a year. 1998 SFP includes 17 questions about religious and classic paranormal questions. First three questions address traditional religious dogma (heaven and hell, the devil and God answers prayers), other 7 questions are about classical paranormal phenomena (astrology, déjà vu, extrasensory perception, extraterrestrials, ghosts, psychic healing and reincarnation), other paranormal questions compose of two paranormal experiences and the remaining five questions are related to belief in god, superstitious, life after death, evolution versus creation. Paranormal Belief Scale was translated into Turkish by authors (See Appendix B). The scale combines "believe", "don't believe" and "not sure" response categories ("believe" responses were coded 2, "not sure" responses were coded 1 and "don't believe" responses coded 0). In these measures, high ratings represent higher paranormal beliefs. In terms of validity and reliability of the instrument, reliability and factor analysis were performed by the authors of current study. Cronbach's alpha reliability coefficient was found to be 0.87.

Data Collection and Analysis

The study was carried out during 2012-2013 fall semester at a large university in Ankara, Turkey. Students were selected based on convenience sampling method. Students were given information about purpose and content of this study and invited to participate into the study voluntarily. The use of instrument took about 20 minutes to

complete questionnaires. In the present study, data from questionnaire were analyzed through Statistical Package for the Social Sciences (SPSS) Version 15.0 statistical program. Content validity of the Rice (2003) Paranormal Questions' Turkish version was provided by 2 experts from the same university that authors study in.

Results

Before factor analysis, we made some adjustment on devil possesses people item. In this item, we replaced devil with jinn because Jinn are common concept in Turkish culture instead of devil. According to Muslim beliefs devil does not possess people but Jinn do. We also inserted some explanations for some items definition to better understanding of the items which increase the content validity of our scale.

Then, authors applied factor analysis to Rice (2003) paranormal belief questions after we translated and collected data in SPSS program. In first attempt, we got five different factors. Although these five categories are not clearly separate from each other, some factors as religious beliefs, classical paranormal beliefs, psychic power, and extraordinary life forms items constructed different factors. In order to interpret these items better, we limited factor analysis into 2 factors. As it was supposed, two factors clearly separated from each other. The 2 factors were named based on literature and the content of items. The factors were named as; religious paranormal beliefs and classic paranormal beliefs. However, déjà vu item didn't work in this factor analysis. Therefore, we removed this item from our questionnaire and we repeated the same procedure. After omitting déjà vu item, we got two factors that separated from each other as religious and classical paranormal beliefs (See Table 1).

Table 1. Rotated factor loadings for paranormal beliefs scale

Items	Factor 1: Religious	Factor 2: Classic
Heaven and Hell	.891	
Life after Death	.890	
Is there a God?	.876	
God answers prayers	.847	
Creation versus Evolution	.819	
Illness cured by prayer	.668	
Jinn possesses people	.519	
Extraterrestrials		.636
Reincarnation		.633
Ghosts		.630
UFOs		.619
Astrology		.603
ESP		.559
Use mind to heal body		.518
Psychic healing		.486
Superstitious		.485
Déjà vu (removed)		

Table Notes. Loadings less than 0.4 are omitted

In addition, authors investigated the correlation among seven religious paranormal belief items. According to results, there were positive correlations among the items (see Table 2). Furthermore, authors found religious paranormal factor's reliability .91.

Table 2. Correlation matrix of religious paranormal beliefs

	Life after Death	Is there a God?	God answers prayers	Creation versus Evolution	Illness cured by prayer	Jinn possesses people
Heaven and Hell	.88	.79	.77	.65	.49	.39
Life after Death		.74	.72	.67	.48	.39
Is there a God?			.81	.67	.55	.36
God answers prayers				.60	.42	.44
Creation versus Evolution					.52	.43
Illness cured by prayer						.45

Authors also examined the eight classical paranormal belief items (see Table 3). Moreover, classical paranormal factor's reliability is .74. These findings indicated that items fit correctly together in each factor.

Table 3. Correlation matrix of classical paranormal beliefs

	Reincarnation	Ghosts	UFOs	Astrology	ESP	Use mind to heal body	Psychic healing	Superstitious
Extraterrestrials	.32	.22	.70	.14	.34	.16	.8	.16
Reincarnation		.40	.29	.30	.19	.10	.18	.18
Ghosts			.22	.34	.34	.19	.29	.29
UFOs				.13	.29	.12	.15	.11
Astrology					.47	.36	.39	.35
ESP						.27	.15	.28
Use mind to heal body							.59	.24
Psychic healing								.22

Finally, the component correlation matrix was analyzed in order to ensure discriminant validity of the scale, that is, whether two factors were independent. The component correlation matrix enables us to evaluate the relation between two factors. Based on the result, the correlation between two components was very low ($r = .23$), so we can assume that there were two components for this scale (Pallant, 2006) (See Table 4).

Table 4. Component correlation matrix

Factors	Factor I	Factor II
Factor I	-	.227
Factor II	.227	-

Discussion and Conclusion

In the current study, researchers translated Rice (2003) Paranormal Belief Questions in Turkish and applied factor analysis limiting 2 factors as classical paranormal and religious paranormal beliefs. Factor analysis and check of questionnaire by 2 experts increased our paranormal belief survey's content validity. Moreover, it was found good reliability ($r=.87$) for these scale. This finding is in line with findings by Rice (2003) with the exception of déjà vu item. Déjà vu item did not load on any of the two factors. More specifically, belief in déjà vu, the most commonly reported paranormal belief ($\mu=1.68$, $SD=.67$), does not fit our measurement model. Déjà vu is qualitatively different from other reported paranormal beliefs. This finding concurs with the other studies (Fox, 1992; McClenon, 1990). Sno and Linszen (1990) stated that déjà vu stems from physiological processes regarding how memory processed and stored. Fox (1992) argued that déjà vu is not always perceived as a paranormal phenomenon within experimental parapsychology and survey research tradition. Therefore, the findings of this study back up this perspective, and thus, déjà vu item were excluded from analysis.

As science educators, we think that understanding scientific concepts and nature of science is powerful tool to decrease harmful paranormal beliefs such as faith healing, and psychic surgery, so science education should be improved such that learning to think critically and act in a scientific manner should be part of the goal of science education. In this respect, Brigstock (2003) stated that skepticism towards the paranormal phenomena is much more powerful among science students than in general public. Farha and Stewart (2006) found that students in social science hold stronger paranormal beliefs than students in natural sciences. In contrast to these findings, Salter and Routledge (1971) reported in their study that level of paranormal beliefs is higher among students of natural sciences than of social science. In Turkey, Sürmeli and Saka (2011) reported no differences between pre-service science teachers and other pre-service teachers in relation to their paranormal beliefs. From this perspective, we are not sure only science education is sufficient to reduce the paranormal beliefs especially in religious beliefs because science and religion are different ways of knowing and thus, if an individual have religious beliefs, he/she does not necessarily reject to scientific ones or vice versa (Smith, 2009). Therefore, the main concern of us, as science educators, is overcoming classic paranormal beliefs that are incompatible with science.

Confirmatory factor analysis can be done, putting déjà vu item in paranormal experience part of scale. Moreover, the relationship between scientific knowledge or epistemological understanding and dimensions of paranormal beliefs (classical paranormal, religious paranormal) can be sought by using Turkish version of paranormal scale. There is a difference between universities' culture in Turkey, therefore we suggest that other Turkish researchers to conduct this scale in their own university and compare their findings with our results. Furthermore, this study can be pioneer to other Muslim countries and results can be compared to analyze differences in perceptions of paranormal beliefs.

We thought that Rice (2003) paranormal questions can be good alternative to Toback (1983) paranormal beliefs scale. Toback's paranormal belief scale was used in many studies both in Turkish context and abroad. This new scale may provide new aspects and perspectives in paranormal beliefs studies in Turkish context in terms of religious and classical paranormal beliefs. In addition, Toback's paranormal beliefs scale was revised in recent years and some items were removed from original version of that scale and added some new items to different factors of the scale. However, Rice Paranormal Beliefs Questions provided us two strict factors that can be explained by religious and classical paranormal beliefs. The following studies can also examine the reason why religious and classical paranormal classify two distinct categories. This scale can be used the correlation for different categories of paranormal beliefs and the possible cause-effect relation among them. In addition, this scale can be combined with scientific reasoning, nature of science, epistemological beliefs, attitudes towards science in order to understand effect of scientific beliefs on paranormal beliefs or vice versa.

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Appendix A: The Original Form of Paranormal Questions (Rice, 2003)

Paranormal Belief Questions

1. Do you believe that after people die, souls go to Heaven and Hell?
Believe Don't Believe Not Sure
 2. Do you believe that people are sometimes possessed by the Jinn?
Believe Don' t Believe Not Sure
 3. Do you believe that God answers prayers?
Believe Don' t Believe Not Sure
 4. Which one of these statements comes closest to your belief about God:
God Spirit or Life Force Neither
 5. Which do you think is a more likely explanation for the origin of human life on Earth?
Creationism Evolution Both Neither
 6. Do you believe in life after death?
Believe Don' t Believe Not Sure
 7. Have you personally ever experienced having an illness cured by prayer?
Yes No Not Sure
 8. Do you believe in astrology, that is, that the positions of the stars and planets can affect people's lives?
Believe Don' t Believe Not Sure
 9. Do you believe in ESP, that is extra sensory perception?
Believe Don' t Believe Not Sure
 10. Do you believe that extraterrestrial beings have visited Earth at some time in the past?
Believe Don' t Believe Not Sure
 11. Do you believe in ghosts, that is, that spirits of dead people can come back in certain places and situations?
Believe Don' t Believe Not Sure
 12. Do you believe in psychic or spiritual healing, that is, the power of the human mind to heal the human body?
Believe Don' t Believe Not Sure
 13. Do you believe in reincarnation, that is, the rebirth of the soul in a new body after death?
Believe Don' t Believe Not Sure
 14. Do you believe in déjà vu, that is, the feeling that you have been somewhere or done something before?
Believe Don't Believe Not Sure
 15. In your opinion, are UFOs something real, or just people's imagination?
Real Imagined Depends Not Sure
 16. How superstitious are you?
Very Somewhat Not at all
 17. Have you personally ever used the power of your mind to heal your own body?
Yes No Not Sure
-

Appendix B: The Turkish Version of Paranormal Scale

Paranormal İnanç Ölçeği

-
1. İnsanların öldükten sonra ruhlarının cennete veya cehenneme gideceğine inanıyor musunuz?
İnanıyorum İnanmıyorum Emin Değilim
 2. İnsanların içine cin girebileceğine inanıyor musunuz?
İnanıyorum İnanmıyorum Emin Değilim
 3. Tanrının dualara cevap verdiğiğine inanıyor musunuz?
İnanıyorum İnanmıyorum Emin Değilim
 4. Aşağıdakilerden hangisi sizin Tanrı inancınıza en yakındır?
Tanrı vardır ve birdir Tanrı ruhsal bir güçtür Herhangi bir ruhsal güce ve Tanrı'ya inanmıyorum
 5. İnsan yaşamının kökenini en iyi açıklayan size göre aşağıdakilerden hangisidir?
Yaratılış Evrim Her ikisi Hiç biri
 6. Ahiret gününe inanıyor musunuz?
İnanıyorum İnanmıyorum Emin Değilim
 7. Duaların hastalıkları iyileştirdiğine tanık oldunuz mu?
Evet Hayır Emin Değilim
 8. Astrolojiye (yıldız ve gezegen hareketlerinin insan hayatına etki etmesine) inanıyor musunuz?
İnanıyorum İnanmıyorum Emin Değilim
 9. Bazı insanların altıncı hissi olduğuna inanıyor musunuz? Altıncı His: kişinin olacak olayları tamamen doğal bir güdü ile önceden bilmesi hissi.
İnanıyorum İnanmıyorum Emin Değilim
 10. Uzaylıların dünyayı ziyaret ettiğine inanıyor musunuz?
İnanıyorum İnanmıyorum Emin Değilim
 11. Ruhların bazen dünyaya geri dönebileceğine inanıyor musunuz?
İnanıyorum İnanmıyorum Emin Değilim
 12. İnsanların zihin gücü ile hastalıklarını iyileştirebildiklerine inanıyor musunuz?
İnanıyorum İnanmıyorum Emin Değilim
 13. Ölümünden sonra insanların ruhlarının farklı bedenlerde tekrar dünyaya gelmesine (reenkarnasyon) inanıyor musunuz?
İnanıyorum İnanmıyorum Emin Değilim
 14. İlk defa gittiğiniz bir yeri daha önce gördüğünüz veya ilk defa yaptığınız bir şeyi daha önce yaptığınız (dejavu) hissine inanıyor musunuz?
İnanıyorum İnanmıyorum Emin Değilim
 15. Ufolar gerçek midir yoksa insanların hayal ürünü müdür?
Gerçek Hayal Ürünü Duruma göre değişir Emin Değilim
 16. Batıl inançlara sahip olma derecenizi belirtiniz.
Çok Fazla Biraz Az Batıl inancım yok
 17. Zihin gücünüzü hastalıklarınızı iyileştirmek için kullanır mısınız?
Evet Hayır Emin Değilim
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