

DOI: 10.17986/blm.1607

Adli Tıp Bülteni 2023;28(1):6-14

Gudjonsson Suggestibility Scale-2 Turkish Reliability and Validity Study

Gudjonsson Yönlendirilebilirlik Ölçeği-2'nin Türkçe Geçerlilik ve Güvenirlilik Çalışması

Ezgi İldırım Özcan¹, Neylan Ziyalar²¹Istinye University Faculty of Humanities and Social Sciences, Department of Psychology, İstanbul, Turkey²Istanbul University-Cerrahpaşa, Institute of Forensic Medicine and Forensic Sciences, Department of Social Sciences, İstanbul, Turkey

ABSTRACT

Objective: This paper aims to adapt Gudjonsson suggestibility scale-2 (GSS-2) which is an objective measurement for measuring individuals susceptibility to interrogative suggestibility into Turkish.

Methods: GSS-2 scale translated into Turkish and then backtranslated. Then form is applied to 175 participant whose age ranged from 19 to 36. GSS-2 applied to participants by the researchers. In GSS-2 a story regarding to bicycle accident read to the participants. GSS-2 include immediate recall and delayed recall which is after 45 minutes and formal questioning part which include suggestible questions and negative feedback part. Participants answer the questions about the story they heard during the study. Participants also filled the dissociative experiences scale, submissive act scale, and cognitive failure questionnaire for construct validity. Statistical analysis were performed using SPSS 21 and Lisrel 8.80.

Results: Results of the descriptive analysis showed that the mean score for accurate information recalled and confabulation after immediate recall is 14.99 and 3.23 respectively. For the delay recalled mean score for the accurate information is found 14.42 and 4.03 for confabulation after delayed recalled. For suggestibility scores mean scores are found to be 5.25 for yield 1 score; 6.66 for yield 2 score; 4.1 for shift score and the mean score for the total suggestibility is 9.35. The cronbach alpha values of the subscales of the scale were calculated 0.713 for yield 1, 0.812 for yield 2, 0.600 for shift score. Confirmatory factor analysis failed that yield 1 factor found to be unidimensional in accordance with the original, however, shift factor did not show unidimensional properties, that some questions did not fit the factor structure.. There was no significant relationship between GSS-2 scores and the other scales determined for construct validity.

Conclusion: The results are discussed in comparison with GSS-2 adaptations in different languages. The study results suggest that culture and language factors may be effective in witness memory and suggestibility. There is need for further studies regarding to Turkish form of GSS-2.

Keywords: Eyewitness testimony, eyewitness memory, suggestibility, Gudjonsson suggestibility scale



Address for Correspondence/Yazışma Adresi: Ezgi İldırım Özcan, İstinye University Faculty of Humanities and Social Sciences, Department of Psychology, İstanbul, Turkey

E-mail: eildirim@gmail.com

ORCID ID: orcid.org/0000-0002-0805-6506

Received/Geliş tarihi: 09.12.2021
Accepted/Kabul tarihi: 25.04.2022

ÖZ

Amaç: Bu çalışmanın amacı bireylerin sorgu sırasında karşılaşılabilecekleri yönlendirici sorulara ve sosyal yönlendirmelere karşı yatkınlıklarını ölçmek amacıyla objektif bir ölçüm aracı olarak geliştirilen Gudjonsson yönlendirilebilirlik ölçeği-2'nin (GSS-2) Türkçe'ye uyarlanmasını gerçekleştirmektir.

Yöntem: GSS-2 ölçeği orijinal dili olan İngilizce'den Türkçe'ye çevrilmiş, daha sonra geri çeviri ile Türkçe'den İngilizce'ye çevrilmiştir. Ölçek 19-36 yaş aralığında 175 kişiye uygulanmıştır. Bir bisiklet kazasına ilişkin öyküyü dinleyen katılımcılar dinledikten hemen sonra ve 45 dakika sonra hatırladıkları bilgilere ilişkin serbest anlatımda bulunmuşlardır. Daha sonra yönlendirici soruların ve olumsuz geri bildirimde bulunulan kısımdaki kapalı uçlu soruları yanıtlamışlardır. Aynı zaman yapı geçerliliğinin test edilebilmesi için dissosiyatif yaşantılar ölçeği, boyun eğici davranış ölçeği ve bilişsel hata ölçeğini katılımcıların öz bildirimine dayalı bir biçimde doldurulmuştur. İstatistiksel analizler SPSS 21 ve Lisrel 8.80 ile gerçekleştirilmiştir.

Bulgular: Betimsel analiz sonucu, hemen geri çağrılmadaki doğru bilgi ve konfabülasyonun ortalamasını sırayla 14,99 ve 3,23 olarak bulmuştur. Gecikmeli hatırlama için doğru bilgi 14,42 ve konfabülasyon 4,03 olarak tespit edilmiştir. Yönlendirmeye ilişkin puanlarda kabul 1 (yield 1) için ortalama 5,25; kabul 2 (yield 2) için ortalama 6,66; değişim (Shift) puanlaması için ortalama 4,1 ve toplam yönlendirilebilirlik için ortalama 9,35 olarak bulunmuştur. Ölçeğin alt boyutlarının cronbach alfa değerleri yield 1, yield 2 ve shift için sırasıyla 0,713, 0,812, 0,600 olarak hesaplanmıştır. Doğrulamalı faktör analizi, kabul 1 faktörünün orijinal ölçekle uyumlu olarak tek boyutlu olduğu, ancak değişim faktörünün tek boyutlu özellikler göstermediği, bazı soruların faktör yapısına uymadığı sonucuna varmıştır. GSS-2 puanları ile yapı geçerliği için belirlenen ölçekler arasında anlamlı bir ilişki bulunmamıştır.

Sonuç: Bulgular farklı dillerdeki adaptasyon çalışmalarından elde edilen veriler ışığında karşılaştırılmıştır. Ölçek ile ilgili edinilen bulgular dil ve kültür farklılığının önemli olduğu göstermektedir. Ölçeğin kullanımı için norm çalışmalarına ihtiyaç vardır.

Anahtar Kelimeler: Tanık ifadesi, tanık hafızası, yönlendirilebilirlik, Gudjonsson yönlendirilebilirlik ölçeği

INTRODUCTION

The reliability of eyewitnesses in the justice system is one of the issues that has been discussed and studied for many years. Research on the fallibility of memory began in the 1800s, yet until 1970s, finding of the psychology studies on eyewitness reliability is not used in the field of law (1). Starting from the 1970's studies have shown that memory is fallible and that witnesses memory can be affected from various factors such as age, suggestible questions (2-5). Today, "Innocence Project" started in the USA showed that many innocent people convicted because of the fallible memories of the witnesses or because of the false statements given due to social pressure (6).

Studies showed that there are various factors affecting the reliability of the eyewitness memory. The factors affecting the testimony of eyewitnesses were divided into two as predictive variable and system variables by Wells and Olson (7). Predictive variables are the factors that cannot be controlled within the justice system, but their effects can be predicted like age of the witness (7). On the other hand, system variables are the variables that can be controlled by the justice system like time interval between the crime and investigative interview, questions asked in the investigative interview (7). Both predictive and estimator variables effect the reliability of the witness testimony (7-9).

Research on eyewitness memory today still try to determine the factors effecting the accuracy of the testimony. Study conducted by the Loftus (2) is a milestone in the false memory studies that found out the falseability of the memory. Study revealed that the answers of the participants are effected by the wording of the question. Loftus argued that new information obtained through

the questions cause change in the original memory. On the other hand, after the Loftus study McCloskey and Zaragoza (3) conducted another study on memory and concluded that old memory and new memory exist simultaneously in the memory. Researchers stated that people's are effected by suggestions because they assume that the information in the question was correct. In line with the McCloskey and Zaragoza (3), another explanation for false memory is the source monitoring theory which is also stated that the old and new memories are found together. Memory errors are caused by mistaken source of the memory (10).

Today, studies on the eyewitness testimony also emphasize the social factors. Research has found that most people tend to comply with everything the interviewer said because of the social pressure caused by the interviewer (11,12). The mechanism underlying memory errors is still being discussed and tried to be resolved by researchers today (13).

One of the factor that the researchers focus on is the questions asked in the investigative interview. It has been found that the questions asked during the investigative interview effect the accuracy, content and amount of information of the statement (14,15). Although the mechanisms of false memories are still not fully understood, researchers have demonstrated that suggestible questions distort the content of memories in memory (2,16). For this reason, Gudjonsson designed the Gudjonsson suggestibility scale (GSS) which is an objective psychometric scale to measure people openness to suggestibility. This scale aims to measure effect of negative feedback and misleading questions on testimony (17).

GSS focuses on cognitive and social factors of the suggestibility that the scale has two factors which are yield and shift (17). Gudjonsson and Clark (18) model of interrogative suggestibility suggest that accuracy of the testimony based on several social and cognitive aspects. The model is also known as social psychological model of interrogation as it take into account both cognitive and social factor. The model focus on two different source of the suggestibility that are suggestibility through the questions and suggestibility through the feedback by the interviewer (18). GSS is developed based on this model to measure suggestibility. Different scores give information related to measurement of different aspects of the suggestibility. One of these aspects is based on the score calculated through answers given to the misleading questions. These questions contain leading information and aimed to mislead the participants about the event. Studies have found that the wording of the questions effect the answers of the interviewee (2,19-23). The second factor is how much people are effected by social pressure (11,12,23). Interviewer verbal and non-verbal feedback effect the answers of the participants (24,25). GSS also give score based on the change of answers of the participants after the feedback (17).

GSS is developed as two parallel form as GSS-1 and GSS-2. As these two forms similar to each other GSS-1 include a story of a crime and GSS-2 include non-criminal story. GSS include immediate and delayed free recall and formal questioning part. The delay between the immediate and delayed recall is 50 minute. Formal questioning part include suggestible questions and negative feedback part (26).

Both GSS-1 and GSS-2 measure four suggestibility score which are yield 1, yield 2, shift and total suggestibility score. Factor analysis revealed that suggestible questions and other control questions in the formal questioning part load to the two different factor. Factor analysis of 20 questions used in scoring "yield 1" was made. It was found that 15 questions containing suggestible information contributed to the scoring. As a result of the analysis, it was seen that the loads of the items were homogeneous. In the factor analysis of the "shift" score, it was observed that the load of 15 items containing suggestible information was heterogeneous, but the other 5 questions were collected in other factors. In the factor analysis of 40 questions in total, it was found that the "shift" score and the "yield 1" score were differentiated and grouped under different factors (17). Internal consistency analysis values were 0.87 for the "yield 1" subscore, 0.90 for the "yield 2" subscore, and 0.79 for the "shift" score of GSS-2. Factor analysis showed that "yield" and "shift" sub-items were grouped under different factors (27). The researcher found that there was a significant correlation between the score obtained from the free recall question and the

score obtained from the "yield" scores in the groups. The "shift" score was highly correlated with the "yield 2" score (the second is the scoring of 20 questions answered) (17). For the parallel form reliability GSS-2 had a mean and standard deviation close to GSS-1. When the results of the analysis checked, it was seen that GSS-2 is more reliable than GSS-1. Studies have stated that GSS-1 and GSS-2 can be used interchangeably (27).

The norm values of the scale is based on the British and Icelandic population. General population mean values for immediate recall, delayed recall, yield 1, yield 2, shift and total suggestibility scores for 19.7, 18.4, 4.5, 5.5, 3, 7.5 respectively for GSS-2 (26). The scale has reliability and validity studies conducted for Italian, Portugese, Dutch, Polish, Japanese sample. These studies concluded that GSS is reliable and valid scale. The data from the different population showed that mean values for the scores differed for different samples (27-32). Portugese adaptation and Polish adaptation results similar with the original scale whereas Estonian adaptation mean values differed from the original (29,31). The norm studies conducted with court referals, police detainees, forensic person with intellectual disability and non-forensic persons with intellectual disability sample (26,33-35).

Suggestibility scores measured by GSS positively correlated with dissociation, anxiety, self-monitoring and negative life events (36-39). Dutch study on the GSS found that dissociation has positive correlation with suggestibility (40) whereas Polish study could not found anystatistical significant correlation (31). Studies conducted by Drake (39) showed that frequency of negative life events increase the suggestibility of the participant and by age the cumulative effect of negative life events increased (39,41). Some studies found personality and suggestibility scores are correlated that Gudjonsson found positive correlation between neuroticism and suggestibility (42). Besides Liebman et al. (43) found that extraversion positively correlated with the suggestibility score. However there are studies did not find any statistically significant correlation with personality and suggestibility (44). Another factor found to be correlated with the suggestibility score is IQ level and cognitive abilities that there was negative correlation between the cognitive abilities and suggestibility (33,45-47).

Shortly, the GSS is a scale applied both in academic studies and in the judicial system in some countries (26,47). The studies on GSS-2 has shown that the scale has acceptable validity and realibility measures (26-28,32,48-50). It has been translated in different languages (27-32). Translation of the scale into Turkish may contribute to the increase of studies to be conducted in the Turkish sample and to evaluate the reliability of eyewitness testimony in the judicial system. The main aim of the study is to conduct a Turkish adaptation of the GSS-2 scale.

MATERIALS and METHODS

Sample

The participants recruited by convenience sampling method based on volunteering. Participants were called through announcements. Total of 175 people participated in the research. The ages of the participants ranged from 19 to 36. One hundred four of the participants were female and 68 were male, and 3 people did not specify their gender. Most of the participants were undergraduate students. The average age of the participants was 23.3.

Materials

GSS-2

GSS-2 which is developed by the Gudjonsson, consists of a narrative of a bicycle accident and 20 questions regarding to this narrative. There are 15 suggestible question and 5 non-suggestible questions related to the scale. There are three different types of leading questions included to the scale. The first of these are the leading question which include plausible suggestions. The other leading question type is the wrong alternative questions in which two wrong alternatives are presented in the question. The last are the confirming questions. Although these questions do not contain a suggestion, they are designed to create doubt in the memory of the people.

Translation and the back translation of the form has done by the four psychologists who know English language. Back translations are compared with the original form, the translation which match closely to the original forms has chosen for the study.

For the scoring of the scale; immediate recall, delayed recall and formal questioning part scored separately. For free recall parts including immediate and delayed recall, four type of score has been calculated which are memory recall, distortions, fabrications and total confabulation. Confabulation score is calculated by adding distortion score and fabrication score. For formal questioning part four type of score has been calculated which are yield 1, yield 2, shift and total suggestibility score.

Cognitive failures questionnaire

The original scale was developed by Broadbent et al. (51). The scale aims to measure errors in memory, perception and motor functions, which appear as absent-mindedness in daily life. The scale consists of 25 question which are rated on 5-point Likert scale.

The Turkish adaptation study of the scale was carried out by Şenkal et al. (52). The lowest score that can be obtained from the scale is 0 and the highest score is 100. It has been determined that the Turkish form has four factors. The Cronbach's alpha values of the Turkish form were calculated as 0.87 for forgetting

sub-dimension, 0.74 for attention sub-dimension, 0.69 for motor functionality, and 0.88 for perception-concentration. The alpha value for the total score was found to be 0.91. Test-retest reliability was found to be 0.54, 0.36, 0.46, 0.39 and 0.42 for total score, perception-concentration, forgetting, attention, and motor functionality, respectively.

Submissive behavior scale (SBS)

SBS was developed by Gilbert and Allan (53). It consists of 16 item which are rated on 5-point Likert scale. The internal consistency coefficient of the original scale was 0.89, and the test-retest reliability was found to be 0.84.

The internal consistency coefficient of the scale was calculated as 0.74. The Turkish validity and reliability study and the adaptation study conducted by Savaşır and Şahin (54). The scale showed a significant correlation with the Beck depression inventory and sociotropy scales at the level of 0.32 and 0.36, respectively. Test-retest reliability was calculated as 0.84 (54).

Dissociative experiences scale (DES)

The scale is a 28-item scale developed to measure the dissociative experiences of people in the normal and clinical population, in which people evaluate themselves between 0 and 100. The results of the validity and reliability analysis showed that the Cronbach alpha coefficient for university students was calculated as 0.93, and the test-retest reliability as 0.93 (55).

The Turkish validity and reliability study of the scale was carried out by Yargic et al (56). Analysis showed that, the half validity coefficient of the test was determined as 0.86 for the participants with multiple personality disorder and 0.89 for the non-patient group. The test-retest correlation was 0.78. The item-total correlation varies between 0.35 and 0.83.

Procedure

Participants who voluntarily participated first listened to the GSS-2 story. Immediately after the narration, the participants were asked to answer the free recall question by giving the instruction "Please tell me everything you remember about the story". Responses of individuals were audio recorded with permission. Then there was a break of 45 minutes. After the break, participants were asked for a delayed recall. Afterwards, the researcher gave the instruction and asked 20 closed-ended questions. The researcher then told the participant, you answered some of the questions incorrectly, now I want you to answer the questions again. This time, I will ask you to answer more carefully. After this negative feedback, the participants were asked to answer 20 closed-ended questions again. At the end of the study participants are informed regarding to study main purpose and their data are used if they permitted after the information given.

Ethical Considerations

03/07/2015 dated 2015/09 numbered İstanbul Arel University Ethic Board decision regarding to GSS Turkish adaptation study is confirmed. Because study results can be effected by the prior information, intentional deception method had been used. Beginning of the study participants have given informed consent for participation. Because intentional deception used after the experiment was completed participants debriefed regarding to study.

Statistical Analysis

Statistical analyzes were performed using SPSS 21 and Lisrel 8.80. While SPSS 21 program was used for descriptive statistics, validity and correlation analysis, Lisrel 8.80 program was used for confirmatory factor analysis.

RESULTS

The number of information recalled immediately after the narration (immediate recall), the number of information remembered about the story after a 45-minute break (delayed recall), yield 1, yield 2, shift taken from the GSS-2 and total suggestibility scores and the mean value, standard deviation and interval values of distortion, fabrication and confabulation scores, which are the scores for people's false memories regarding to the story are given in the table below (Table 1).

In order to examine the construct validity of the scores obtained from the GSS-2 scale, the relationship between the scores

obtained from the SBS, the DES and the cognitive errors scale was examined. There was no statistically significant correlation between the scores obtained from the GSS-2 scale and the scores obtained from the SBS (Table 2).

The Cronbach alpha coefficients were calculated as 0.713, 0.812, 0.600 and 0.740 for yield 1, yield 2, shift and total suggestibility, respectively. Total of 12 different scores can be get from the GSS-2 scale. The relationship between these scores was analyzed by calculating the Pearson correlation coefficient. A strong positive correlation was found between the suggestibility scores which are yield 1, yield 2, shift, and the total suggestibility score (Table 3).

Confirmatory factor analysis applied to determine factorial structure of the scale. While the questions belonging to the yield 1 score type were collected under a single factor, it is found that the factor structure of the questions belonging to the shift score type did not show factorial load as in original form. The factor loads of yield 1 item found between 0.06 and 0.25. For shift factor although some of the factor loads of shift items are negative, they vary between 0.0 and 0.07. Goodness of fit statistics are found as $\chi^2/df=0.05$, RMSEA=0.00, GFI=0.99, SRMR=0.016 (57) (Figure 1).

Participants answered compared for immediate free recall and delayed free recall, scores regarding to free recall which are total recall, distortion and fabrication show significant difference for two different time (Table 4).

Table 1. Descriptive statistics for scores

	Minimum	Maximum	Mean	Standard deviation
Immediate recall	5	32	14.99	5.29
Distortion-immediate recall	0	6	1.98	1.43
Fabrication-immediate recall	0	5	1.25	1.37
Confabulation-immediate recall	0	10	3.23	1.89
Delayed recall	4	33	14.42	5.05
Distortion-delayed recall	0	8	2.27	1.58
Fabrication-delayed recall	0	10	1.76	1.73
Confabulation-delayed recall	0	12	4.03	2.24
Yield 1	0	15	5.25	2.95
Yield 2	0	14	6.66	3.68
Shift	0	12	4.10	2.68
Total suggestibility	0	20	9.35	4.62

Table 2. Correlation between GSS-2 and other scale

	SBS	CFQ	DES
Yield 1	-0.039	-0.127	-0.054
Yield 2	-0.034	-0.203*	-0.077
Shift	0.036	-0.067	0.075
Total suggestibility	-0.003	-0.126	0.012

*p<0.05, CFQ: Cognitive failures questionnaire, SBS: Submissive behavior scale, DES: Dissociative experiences scale

Table 3. Correlation among scores of GSS-2

	1	2	3	4	5	6	7	8	9	10	11	12
1. Immediate recall	-	0.846**	-0.008	-0.021	-0.022	-0.023	0.033	0.009	-0.284**	-0.267**	-0.208**	-0.302**
2. Delayed recall		-	-0.065	-0.055	-0.088	-0.104	-0.023	-0.091	-0.332**	-0.291**	-0.183**	-0.319**
3. Distortion-immediate			-	-0.081	0.696**	0.477**	0.117	0.427**	-0.072	-0.085	0.023	-0.033
4. Fabrication-immediate recall				-	0.660**	-0.144	0.543**	0.321**	0.045	-0.016	-0.019	0.018
5. Confabulation-immediate recall					-	0.256**	0.479**	0.553**	-0.022	-0.076	0.004	-0.012
6. Distortion-delayed recall						-	-0.091	0.633**	0.036	-0.008	0.039	0.046
7. Fabrication-delayed recall							-	0.713**	0.025	0.006	0.017	0.026
8. Confabulation-delayed recall								-	0.045	-0.001	0.041	0.053
9. Yield 1									-	0.777**	0.341**	0.838**
10. Yield 2										-	0.592**	0.841**
11. Shift											-	0.798**
12. Total suggestibility												-

**p<0.001, GSS-2: Gudjonsson suggestibility scale-2

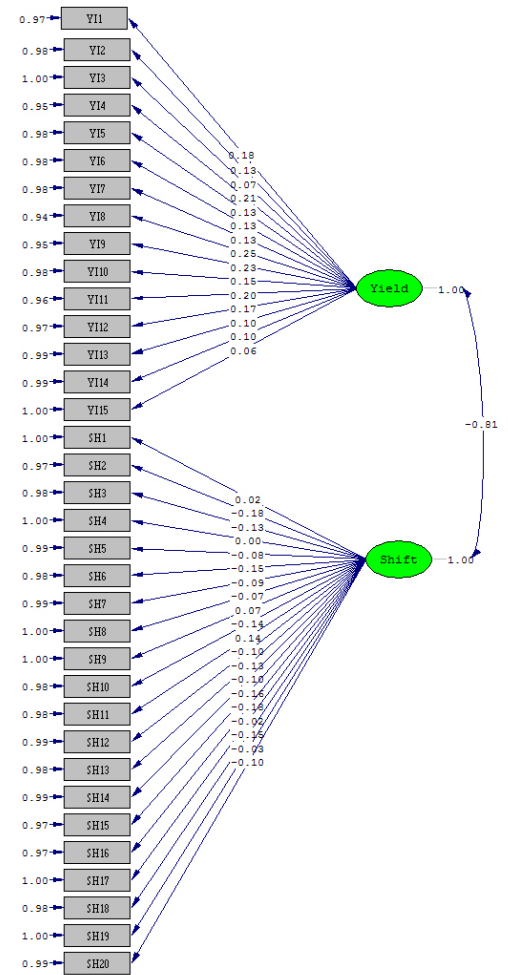


Figure 1. Confirmatory analysis of the GSS-2

GSS-2: Gudjonsson suggestibility scale-2

After the participants answered 15 suggestible questions, the difference between the answers given to the same questions after the negative feedback received was examined with the Wilcoxon signed ranks test, which is a non-parametric analysis method. Result of the analysis found a significant difference between the answers given after negative feedback and the first answers ($Z=-7.09, p<0.001, r=0.53$).

DISCUSSION

The accuracy of the witness testimony, that is, the accuracy of the witness memory, is important for the fair trial. Many variables in the judicial system effect the accuracy of the eyewitness testimony. Suggestible questions are one of these factors that may effect the reliability of the testimony. The results of the research showed that suggestible questions and feedbacks from the interviewer negatively effect the memory of the witness.

The aim of this study was to conduct a Turkish validity and reliability study of the GSS, which was developed by Gudjonsson

Table 4. T-test analysis for immediate recall and delayed recall scores

		Mean	N	SD	t	df	Sig
Pair 1	Immediate recall	14.99	175	5.29	2.714	174	0.007*
	Delayed recall	14.42	175	5.05			
Pair 2	Distortion-immediate recall	1.98	175	1.43	-2.439	174	0.016*
	Distortion-delayed recall	2.27	175	1.58			
Pair 3	Fabrikasyon-immediate recall	1.25	175	1.37	-4.401	174	0.000*
	Fabrikasyon-delayed recall	1.76	175	1.73			

*p<0.05, SD: Standard deviation

(58) to determine how much people are affected by suggestible questions and the feedbacks. Within the scope of the study, the scores obtained from the scale and the statistical properties of the scale were examined. Although there was no statistically significant result between the scores of the DES, SBS, Cognitive errors scale and GSS-2 scale, the Cronbach's alpha values of the scale were in the acceptable range. In addition, a medium-high correlation was found between the score types within the scale itself. At the same time, the result of the study showed that negative feedback influenced the answers given by the participants.

The results of the study show certain differences when compared with the results of research conducted in different countries. These differences are especially evident in the free narrative in the immediate and delayed recall question (26,31). This situation raises questions about the cross-cultural validity of the scale. Studies on cognition have revealed that memory processes are effected by culture (59-61). Besides recent studies on the effect of culture on eyewitness testimony showed that participants testimony change based on their culture whether they were from collectivist culture or individualistic culture (62,63).

Another issue on which culture is influential is the relationship with authority. Studies in the field of social psychology show that trust and submission to the authority figure, which is accepted as one of the characteristics of collectivist culture, can make people make more false statements during interrogation (64). On the other hand, when examined, the rate of answers that were changed after the negative feedback yield 2 and shift scores are found to be similar to the original form (26,65). The suggestibility manipulation on the scale resulted in participants changing their answers, as expected. This, in parallel with other studies in the literature, shows that witnesses' memories are effected by suggestible information (66,67).

CONCLUSION

To conclude, one of the results of this study showed the importance of the questions and feedbacks during the interrogation. It is found that suggestible questions and negative feedback given by the interviewer cause change in the testimony of the witness. In cases where witness testimony

is important, and sometimes the only piece of evidence, it is important to obtain accurate testimony. As in the some of the countries used, GSS can be used to determine degree of openness to suggestibility. It can be used to evaluate the reliability of the witness testimony especially if there is doubt of suggestibility. In such cases, the GSS scale, which is an objective measurement tool, can give scientific evidence related to accuracy of testimony.

In the light of the results, it is suggested that the Turkish version of the scale can be used in practice, but the results should be interpreted carefully. Although the Turkish form of the scale can be applied and interpreted by experts, it is important to conduct more studies in order to implement the scale. Although the factors associated with the sample differ according to the studies and the sample to which it is applied, the relationship between other factors that may be related and the GSS should be examined.

Due to the lack of norm data, the results obtained should be approached carefully. Especially for this scale, which is thought to be used in the forensic field, the data to be obtained from the studies conducted in the detainee/convict populations are important. Within the scope of this study, sample consisted of university students that the average values obtained are valid for this sample. However, more research should be conducted to make the scale more useful in practice. It is expected that this study will contribute to the development of objective measurement tools that are more suitable for our culture and can be used in the forensic field in the future.

Information: Some part of this study was presented as oral presentation at "1. International and 17. National Forensic Science Congress" held online, entitled as "Reliability and Validity of Turkish Version of Gudjonsson Suggestibility Scale-2". This study was prepared by rearrangement of the doctoral thesis by Ezgi Ildırım Özcan, entitled as "Turkish Reliability and Validity Study of Gudjonsson Suggestibility Scale-2".

Ethics

Ethics Committee Approval: This study is approved by the İstanbul Arel University Ethical Board at 03/07/2015 with the number of 2015/09. Helsinki Declaration criterias are considered during the study.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Concept: E.I.Ö., N.Z., Design: E.I.Ö., N.Z., Data Collection or Processing: E.I.Ö., Analysis or Interpretation: E.I.Ö., N.Z., Literature Search: E.I.Ö., Writing: E.I.Ö.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

REFERENCES

1. Sporer SL. A brief history of the psychology of testimony. *Current Psychological Reviews*. 1982;2(3):323-339. <https://doi.org/10.1007/BF02684465>
2. Loftus EF. Leading questions and the eyewitness report. *Cogn Psychol*. 1975;7(4):560-572. [https://doi.org/10.1016/0010-0285\(75\)90023-7](https://doi.org/10.1016/0010-0285(75)90023-7)
3. McCloskey M, Zaragoza M. Misleading postevent information and memory for events: arguments and evidence against memory impairment hypotheses. *J Exp Psychol Gen*. 1985;114(1):1-16. <https://doi.org/10.1037//0096-3445.114.1.1>
4. Loftus EF, Miller DG, Burns HJ. Semantic integration of verbal information into a visual memory. *J Exp Psychol Hum Learn*. 1978;4(1):19-31. <https://doi.org/10.1037/0278-7393.4.1.19>
5. Paz-Alonso PM, Goodman GS, Ibabe I. Adult eyewitness memory and compliance: effects of post-event misinformation on memory for a negative event. *Behav Sci Law*. 2013;31(5):541-558. <https://doi.org/10.1002/bsl.2081>
6. Innocenceproject.org [Internet] 2021 [updated 2021; cited 2021 December 6] Available from: <https://innocenceproject.org/>
7. Wells GL, Olson EA. Eyewitness testimony. *Annu Rev Psychol*. 2003;54(1):277-295. <https://doi.org/10.1146/annurev.psych.54.101601.145028>
8. Tuckey MR, Brewer N. The influence of schemas, stimulus ambiguity, and interview schedule on eyewitness memory over time. *J Exp Psychol Appl*. 2003;9(2):101-118. <https://doi.org/10.1037/1076-898X.9.2.101>
9. Shaw JS, Bjork RA, Handal A. Retrieval-induced forgetting in an eyewitness-memory paradigm. *Psychon Bull Rev*. 1995;2(2):249-253. <https://doi.org/10.3758/BF03210965>
10. Lindsay DS. Memory source monitoring and eyewitness testimony. In: Read DJ, Toglia M, editors. *Adult eyewitness testimony: Current trends and developments*. Cambridge: Cambridge University Press; 1994. p. 27-55.
11. Robinson J, Briggs P. Age trends in eye-witness suggestibility and compliance. *Psychology, Crime Law*. 1997;3(3):187-202. <https://doi.org/10.1080/10683169708410812>
12. Bradfield AL, Wells GL, Olson EA. The damaging effect of confirming feedback on the relation between eyewitness certainty and identification accuracy. *J Appl Psychol*. 2002;87(1):112-120. <https://doi.org/10.1037/0021-9010.87.1.112>
13. Otgaar H, Sauerland M, Petrila JP. Novel shifts in memory research and their impact on the legal process: introduction to the special issue on memory formation and suggestibility in the legal process. *Behav Sci Law*. 2013;31(5):531-540. <https://doi.org/10.1002/bsl.2095>
14. Lipton JP. On the psychology of eyewitness testimony. *J Appl Psychol*. 1977;62(1):90. <https://doi.org/10.1037/0021-9010.62.1.90>
15. Dunning D, Stern LB. Examining the generality of eyewitness hypermnesia: A close look at time delay and question type. *Appl Cogn Psychol*. 1992;6(7):643-657. <https://doi.org/10.1002/acp.2350060707>
16. LaPaglia JA, Chan JCK. Telling a good story: The effects of memory retrieval and context processing on eyewitness suggestibility. *PLoS One*. 2019;14(2):e0212592. <https://doi.org/10.1371/journal.pone.0212592>
17. Gudjonsson GH. A new scale of interrogative suggestibility. *Pers Individ Differ*. 1984;5(3):303-314. [https://doi.org/10.1016/0191-8869\(84\)90069-2](https://doi.org/10.1016/0191-8869(84)90069-2)
18. Gudjonsson GH, Clark NK. Suggestibility in police interrogation: A social psychological model. *Social Behaviour*. 1986;1:83-104. https://www.researchgate.net/publication/232488639_Suggestibility_in_police_interrogation_A_social_psychological_model
19. Loftus EF, Palmer JC. Reconstruction of automobile destruction: An example of the interaction between language and memory. *Behavioral J Verbal Learn*. 1974;13(5):585-589. [https://doi.org/10.1016/S0022-5371\(74\)80011-3](https://doi.org/10.1016/S0022-5371(74)80011-3)
20. Christiaansen RE, Ochalek K. Editing misleading information from memory: Evidence for the coexistence of original and postevent information. *Mem Cognit*. 1983;11(5):467-475. <https://doi.org/10.3758/BF03196983>
21. Paz-Alonso PM, Goodman GS. Trauma and memory: Effects of post-event misinformation, retrieval order, and retention interval. *Memory*. 2008;16(1):58-75. <https://doi.org/10.1080/09658210701363146>
22. Aydin C, Ceci SJ. The role of culture and language in avoiding misinformation: Pilot findings. *Behav Sci Law*. 2013;31(5):559-573. <https://doi.org/10.1002/bsl.2077>
23. Semmler C, Brewer N, Wells GL. Effects of postidentification feedback on eyewitness identification and nonidentification confidence. *J Appl Psychol*. 2004;89(2):334-346. <https://doi.org/10.1037/0021-9010.89.2.334>
24. Wells GL, Douglass Bradfield A. "Good, you identified the suspect": Feedback to eyewitnesses distorts their reports of the witnessing experience. *J Appl Psychol*. 1998;83(3):360-376. <https://doi.org/10.1037/0021-9010.83.3.360>
25. Gabbert F, Memon A, Allan K, Wright DB. Say it to my face: Examining the effects of socially encountered misinformation. *Leg Criminol Psychol*. 2004;9(2):215-227. <https://doi.org/10.1348/1355325041719428>
26. Gudjonsson GH. *The Gudjonsson suggestibility scales manual*. Psychology Press; 1997. <https://www.prpress.com/Gudjonsson-Suggestibility-Scales.html>
27. Gudjonsson GH. *The psychology of interrogations, confessions and testimony*. John Wiley & Sons; 1992. <https://psycnet.apa.org/record/1992-98194-000>
28. Bianco A, Curci A. Measuring interrogative suggestibility with the Italian version of the Gudjonsson Suggestibility Scales (GSS): Factor structure and discriminant validity. *Pers Individ Differ*. 2015;82:258-265. <https://doi.org/10.1016/j.paid.2015.03.035>
29. Pires R, Silva DR, Ferreira AS. Portuguese adaptation of the Gudjonsson Suggestibility Scales (GSS1 and GSS2): Empirical findings. *Pers Individ Differ*. 2013;54(2):251-255. <https://doi.org/10.1016/j.paid.2012.09.008>
30. Polczyk R. Interrogative suggestibility: Cross-cultural stability of psychometric and correlational properties of the Gudjonsson Suggestibility Scales. *Pers Individ Differ*. 2005;38(1):177-186. <https://doi.org/10.1016/j.paid.2004.03.018>
31. Wachi T, Watanabe K, Yokota K, Otsuka Y, Hiramasa K. Comparison between Japanese online and standard administrations of the Gudjonsson Suggestibility Scale 2 and effects of post-warning. *Leg Criminol Psychol*. 2019;24(1):71-86. <https://doi.org/10.1111/lcrp.12147>
32. Merckelbach H, Muris P, Wessel I, Van Koppen PJ. The Gudjonsson Suggestibility Scale (GSS): Further data on its reliability, validity, and metacognition correlates. *Soc Behav Pers*. 1998;26(2):203-209. <https://doi.org/10.2224/sbp.1998.26.2.203>
33. Gudjonsson GH. Suggestibility and compliance among alleged false confessors and resisters in criminal trials. *Med Sci Law*. 1991;31(2):147-151. <https://doi.org/10.1177/002580249103100210>
34. Frumkin IB, Lally SJ, Sexton JE. A United States forensic sample for the Gudjonsson suggestibility scales. *Behav Sci Law*. 2012;30(6):749-763. <https://doi.org/10.1002/bsl.2032>
35. Sigurdsson JF, Gudjonsson GH. The psychological characteristics of 'false confessors'. A study among Icelandic prison inmates and juvenile offenders. *Pers Individ Differ*. 1996;20(3):321-329. [https://doi.org/10.1016/0191-8869\(95\)00184-0](https://doi.org/10.1016/0191-8869(95)00184-0)

36. Wolfradt U, Meyer T. Interrogative suggestibility, anxiety and dissociation among anxious patients and normal controls. *Pers Individ Differ*. 1998;25(3):425-432. [https://doi.org/10.1016/S0191-8869\(98\)00023-3](https://doi.org/10.1016/S0191-8869(98)00023-3)
37. Gudjonsson GH. Interrogative suggestibility and compliance. *Suggestibility in legal contexts: Psychological research and forensic implications*. 2013;14:45-46. https://books.google.com.tr/books?hl=tr&lr=&id=wHlla_Jhdpc&oi=fnd&pg=PA45&dq=Gudjonsson+GH.+Interrogative+Suggestibility+and+compliance.+Suggestibility+in+legal+contexts:+Psychological+research+and+forensic+implications&ots=axg5GgmYPJ&sig=ZPqEK0X0epGPnKu9lYnX28gF4f0&redir_esc=y#v=onepage&q=Gudjonsson%20GH.%20Interrogative%20suggestibility%20and%20compliance.%20Suggestibility%20in%20legal%20contexts%3A%20Psychological%20research%20and%20forensic%20implications&f=false
38. Bain SA, Baxter JS, Ballantyne K. Self-monitoring style and levels of interrogative suggestibility. *Pers Individ Differ*. 2007;42(4):623-630. <https://doi.org/10.1016/j.paid.2006.08.021>
39. Drake KE. Interrogative suggestibility: Life adversity, neuroticism, and compliance. *Pers Individ Differ*. 2010;48(4):493-498. <https://doi.org/10.1016/j.paid.2009.11.030>
40. Merckelbach H, Muris P, Rassin E, Horselenberg R. Dissociative experiences and interrogative suggestibility in college students. *Pers Individ Differ*. 2000;29(6):1133-1140. [https://doi.org/10.1016/S0191-8869\(99\)00260-3](https://doi.org/10.1016/S0191-8869(99)00260-3)
41. Drake K, Bull R. Individual differences in interrogative suggestibility: Life adversity and field dependence. *Psychol Crime Law*. 2011;17(8):677-687. <https://doi.org/10.1080/10683160903511967>
42. Gudjonsson GH. Suggestibility, intelligence, memory recall and personality: An experimental study. *Br J Psychiatry*. 1983;142(1):35-37. <https://doi.org/10.1192/bjp.142.1.35>
43. Liebman JI, McKinley-Pace MJ, Leonard AM, Sheesley LA, Gallant CL, Renkey ME, et al. Cognitive and psychosocial correlates of adults' eyewitness accuracy and suggestibility. *Pers Individ Differ*. 2002;33(1):49-66. [https://doi.org/10.1016/S0191-8869\(01\)00135-0](https://doi.org/10.1016/S0191-8869(01)00135-0)
44. Nurmoja M, Bachmann T. On the role of trait-related characteristics in interrogative suggestibility: an example from Estonia. *Trames*. 2008;12(4):371-381. https://kirj.ee/public/trames_pdf/2008/issue_4/trames-2008-4-371-381.pdf
45. Muris P, Meesters C, Merckelbach H. Correlates of the Gudjonsson Suggestibility Scale in delinquent adolescents. *Psychol Rep*. 2004;94(1):264-266. <https://doi.org/10.2466/pr0.94.1.264-266>
46. Sharrock R, Gudjonsson GH. Intelligence, previous convictions and interrogative suggestibility: A path analysis of alleged false-confession cases. *Br J Clin Psychol*. 1993;32(2):169-175. <https://doi.org/10.1111/j.2044-8260.1993.tb01041.x>
47. Singh KK, Gudjonsson GH. Interrogative suggestibility among adolescent boys and its relationship with intelligence, memory, and cognitive set. *J Adolesc*. 1992;15(2):155-161. [https://doi.org/10.1016/0140-1971\(92\)90044-6](https://doi.org/10.1016/0140-1971(92)90044-6)
48. Clare IC, Gudjonsson GH, Rutter SC, Cross P. The inter-rater reliability of the Gudjonsson Suggestibility Scale (Form 2). *Br J Clin Psychol*. 1994;33(3):357-365. <https://doi.org/10.1111/j.2044-8260.1994.tb01132.x>
49. Gignac GE, Powell MB. A psychometric evaluation of the Gudjonsson Suggestibility Scales: Problems associated with measuring suggestibility as a difference score composite. *Pers Individ Differ*. 2009;46(2):88-93. <https://doi.org/10.1016/j.paid.2008.09.007>
50. Singh K, Gudjonsson GH. The internal consistency of the "shift" factor on the Gudjonsson Suggestibility Scale. *Pers Individ Differ*. 1987;8(2):265-266. [https://doi.org/10.1016/0191-8869\(87\)90183-8](https://doi.org/10.1016/0191-8869(87)90183-8)
51. Broadbent DE, Cooper PF, FitzGerald P, Parkes KR. The Cognitive Failures Questionnaire (CFQ) and its correlates. *Br J Clin Psychol*. 1982;21(1):1-16. <https://doi.org/10.1111/j.2044-8260.1982.tb01421.x>
52. Şenkal İ, Palabıykoğlu NR, Bakar EE, Çandar T, Ekinci EBM, Bozoğlu EF, ve ark. Bilişsel Hatalar Ölçeği İle Subjektif Bellek Yakınmaları Ölçeği'nin Türkçe Versiyonlarının Psikometrik Özellikleri. *Psikiyatride Güncel Yaklaşımlar*. 2015;5(1):6-12. https://www.researchgate.net/publication/319940618_Bilissel_Hatalar_Olcegi_ile_Subjektif_Bellek_Yakinmalari_Olcegi'nin_Turkce_Versiyonlari_Psikometrik_Ozellikleri
53. Gilbert P, Allan S. Assertiveness, submissive behaviour and social comparison. *Br J Clin Psychol*. 1994;33(3):295-306. <https://doi.org/10.1111/j.2044-8260.1994.tb01125.x>
54. Savaşır İ, Şahin N. Bilişsel-davranışçı terapilerde değerlendirme: Sık kullanılan ölçekler. Ankara: Türk Psikologlar Derneği; 1997. <https://www.nadirkitap.com/bilissel-davranisci-terapilerde-degerlendirme-sik-kullanilan-olcekler-isik-savasir-nesrin-sahin-kitap1266682.html>
55. Frischholz EJ, Braun BG, Sachs RG, Hopkins L, Shaeffer DM, Lewis J, et al. The Dissociative Experiences Scale: Further replication and validation. *Dissociation*. 1990;3(3):151-153. https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/1653/Diss_3_3_5_OCR_rev.pdf?sequence=4
56. Yargıcı İI, Tutkun H, Şar V. Reliability and validity of the Turkish version of the Dissociative Experiences Scale. *Dissociation*. 1995;3(1):10-13. https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/1589/Diss_8_1_3_OCR_rev.pdf?sequence=4
57. Schermelleh-Engel K, Moosbrugger H, Müller H. Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*. 2003;8(2):23-74. https://www.stats.ox.ac.uk/~snijders/mpr_Schermelleh.pdf
58. Gudjonsson GH. Compliance in an interrogative situation: A new scale. *Pers Individ Differ*. 1989;10(5):535-540. [https://doi.org/10.1016/0191-8869\(89\)90035-4](https://doi.org/10.1016/0191-8869(89)90035-4)
59. Gutches AH, Schwartz AJ, Boduroğlu A. The influence of culture on memory. In *International Conference on Foundations of Augmented Cognition*. Berlin, Heidelberg: Springer; 2011. p. 67-76. https://doi.org/10.1007/978-3-642-21852-1_9
60. Wagar BM, Cohen D. Culture, memory, and the self: An analysis of the personal and collective self in long-term memory. *J Exp Soc Psychol*. 2003;39(5):468-475. [https://doi.org/10.1016/S0022-1031\(03\)00021-0](https://doi.org/10.1016/S0022-1031(03)00021-0)
61. Wang Q, Ross M. What we remember and what we tell: The effects of culture and self-priming on memory representations and narratives. *Memory*. 2005;13(6):594-606. <https://doi.org/10.1080/09658210444000223>
62. Anakwah N, Horselenberg R, Hope L, Amankwah-Poku M, Van Koppen PJ. Cross-cultural differences in eyewitness memory reports. *Appl Cogn Psychol*. 2020;34(2):504-515. <https://doi.org/10.1002/acp.3637>
63. Anakwah N, Horselenberg R, Hope L, Amankwah-Poku M, van Koppen PJ. The acculturation effect and eyewitness memory reports among migrants. *Leg Criminol Psychol*. 2020;25(2):237-256. <https://doi.org/10.1111/lcrp.12179>
64. Krauss DA, Lieberman JD. Psychological and Cultural Aspects of Interrogations and False Confessions: Using Research to Inform Legal Decision-Making. In *Psychological Expertise in Court 2016 Apr 15* (pp. 47-78). Routledge. (<https://www.taylorfrancis.com/chapters/edit/10.4324/9781315602813-8/psychological-cultural-aspects-interrogations-false-confessions-using-research-inform-legal-decision-making>)
65. Gudjonsson GH. A parallel form of the Gudjonsson Suggestibility Scale. *Br J Clin Psychol*. 1987;26(3):215-221. <https://doi.org/10.1111/j.2044-8260.1987.tb01348.x>
66. Zaragoza MS. Memory, suggestibility, and eyewitness testimony in children and adults. In *Children's eyewitness memory*. New York, NY: Springer; 1987. p. 53-78. https://doi.org/10.1007/978-1-4684-6338-5_4
67. Warren AR, Lane P. Effects of timing and type of questioning on eyewitness accuracy and suggestibility. In: Zaragoza MS, Graham JR, Hall GCN, Hirschman R, Ben-Porath YS, editors. *Memory and testimony in the child witness*. Washington, DC: Sage Publications, Inc. 1995. p. 44-60. <https://psycnet.apa.org/record/1995-98602-003>