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Adaptation of the eyewitness metamemory scale into Turkish: a validity and reliability study

Aylin Aydın[1],

[1] Istanbul Nişantaşı University, Nişantaşı Vocational School, Department of Applied English and Translation, Istanbul, Turkey

Abstract

Adaptation of the eyewitness metamemory scale into Turkish: a validity and reliability study

Objective: This study aims to adapt the Eyewitness Testimony Metamemory Scale into the Turkish language and to assess its validity and reliability for use in Turkish-speaking communities. The scale was developed to measure individuals' awareness of their memory capacity for eyewitness accounts.
Methods: The study recruited 201 participants. Statistical methods including exploratory factor analysis and confirmatory factor analysis were used to assess the construct validity of the scale. Cronbach alpha coefficient was calculated to assess the reliability of the scale. The original Eyewitness Metamemory Scale was translated into Turkish and culturally adapted following rigorous methodological guidelines.
Results: Exploratory and confirmatory factor analyses revealed that the construct validity of the scale was robust. In addition, Cronbach's alpha coefficient showed that the scale had a high level of internal consistency. These results support that the Turkish version of the Eyewitness Metamemory Scale is a psychometrically reliable and valid measurement tool.
Conclusion: The Turkish Eyewitness Metamemory Scale has been evaluated as an appropriate and reliable tool for assessing individuals' memory awareness in eyewitnessing contexts in Turkey. This scale provides an important tool for both research and practical applications.
Keywords: Eyewitness Memory, Metamemory, Memory, Scale Adaptation

Öz

Görgü tanıklığı üstbellek ölçeğinin Türkçeye uyarlanması: bir geçerlik ve güvenirlik çalışması

Amaç: Bu çalışma, Görgü Tanıklığı Üstbellek Ölçeği'nin Türkçeye uyarlanmasını ve Türkçe konuşan toplumlarda kullanımı için geçerlilik ve güvenilirliğinin değerlendirilmesini amaçlamaktadır. Ölçek, bireylerin görgü tanıklığı ifadelerine ilişkin bellek kapasiteleri hakkındaki farkındalıklarını ölçmek üzere geliştirilmiştir.
Yöntem: Çalışmaya 201 katılımcı dahil edilmiştir. Ölçeğin yapı geçerliliğini değerlendirmek için açımlayıcı faktör analizi ve doğrulayıcı faktör analizi gibi istatistiksel yöntemler kullanılmıştır. Ölçeğin güvenilirliğini değerlendirmek için Cronbach's alpha katsayısı hesaplanmıştır. Özgün Görgü Tanıklığı Üstbellek Ölçeği, titiz metodolojik yönergeler izlenerek Türkçeye çevrilmiş ve kültürel olarak uyarlanmıştır.
Bulgular: Açıklayıcı ve doğrulayıcı faktör analizleri, ölçeğin yapı geçerliliğinin güçlü olduğunu ortaya koymuştur. Ayrıca, Cronbach's Alpha katsayısı, ölçeğin yüksek düzeyde iç tutarlılığa sahip olduğunu göstermiştir. Bu sonuçlar, Görgü Tanıklığı Üstbellek Ölçeği'nin Türkçe versiyonunun psikometrik açıdan güvenilir ve geçerli bir ölçüm aracı olduğunu desteklemektedir.
Sonuç: Türkçe Görgü Tanıklığı Üstbellek Ölçeği, Türkiye'deki görgü tanıklığı bağlamlarında bireylerin bellek farkındalığını değerlendirmek için uygun ve güvenilir bir araç olarak değerlendirilmiştir. Bu ölçek hem araştırma hem de pratik uygulamalarda önemli bir araç sunmaktadır.
Anahtar Kelimeler: Görgü Tanığı Belleği, Üstbellek, Bellek, Ölçek Uyarlama

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Address for Correspondence: Aylin Aydın, İstanbul Nişantaşı Üniversitesi, Nişantaşı Meslek Yüksekokulu, Uygulamalı İngilizce ve Çevirmenlik Bölümü, İstanbul,Türkiye
Email: aylinaydinacademic@gmail.com
ORCID iD: 0000-0003-0287-3844

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INTRODUCTION

Memory is a dynamic process in which existing information is continuously structured with new information. Eyewitness memory has become a common definition used in recent years to describe the recollections of people who witnessed a crime or were directly involved in the crime and is of great importance in criminal justice and forensic psychology (1). The memories of people who witnessed or committed a crime, which are evaluated under the title of eyewitness memory, are also continuously structured with their own feelings and thoughts and can be considered reliable when it remains uncontaminated and appropriate testing procedures are implemented (2). On the other hand, the concept of metamemory is the person's awareness of these memories and it encompasses individuals' understanding, observation, and regulation of their own learning and memory processes (3). Metamemory, which was first theoretically expressed by Flavell, is based on the components of cognitive processes, metacognitive experience, metacognitive knowledge and strategies and goals as designed in Flavell's Cognitive Monitoring model (4). Flavell associates metacognitive experience with all cognitive processes at the level of cognition or emotion belonging to the individual and expresses metacognitive knowledge as the information belonging to these processes. Strategies are considered as the behaviors necessary for achieving goals and completing cognitive processes.

Metamemory plays a crucial role in eyewitness memory, as it explains how individuals assess the reliability of their recollections and report details with varying levels of confidence. Metamemory is a commonly researched concept in the eyewitness studies which are reputed to be interconnected, as individuals' awareness and monitoring of their memory processes can influence the accuracy and confidence of their recollections in eyewitness scenarios (5). Eyewitness memory, when uncontaminated and properly tested, is mostly reliable, as initial high-confidence identifications strongly indicate accuracy, but it is necessary to highlight that wrongful convictions often arise from the criminal justice system's failure to recognize the inconclusive nature of low-confidence identifications and its role in contaminating evidence through repeated testing (6). However, studies investigating its reliability also indicate that there are contrary results. Elizabeth Loftus and her team revealed for the first time with their studies that eyewitness memory is fallible (7). It is commonly acknowledged that eyewitnesses have difficulty in distinguishing between the source of information and their own observations after the event and tend to believe that the information after the event is their own observations (8). People are affected by the information they are exposed to after the event they witnessed, and this information can direct the memory of the witnesses and change the accuracy of their statements (9). On the other hand, individuals content with their memory tend to exaggerate their confidence, those discontent may inflate confidence after making a lineup selection, and using memory strategies can increase overconfidence, with eyewitness-specific self-efficacy assessments being more effective than general memory evaluations for distinguishing accurate identifications (10). For eliminating these controversies and in order to obtain reliable information from eyewitnesses, it is recommended to use the free recall technique without any intervention (11). Additionally, giving eyewitnesses options would contribute to the data collection process as well. Studies suggest that including a "don't know" response option in lineup procedures offers a practical method to enhance the quality of identification evidence while minimally impacting the overall amount of reliable evidence obtained and recent research challenges prior assumptions by demonstrating that eyewitness confidence is a reliable predictor of the accuracy of lineup selections (12).

The concept of metamemory has the potential to explain if controversies can be eliminated when individuals' self-awareness over their memories is enhanced. In Turkey, eyewitness testimonies are among the primary forms of evidence utilized in legal proceedings. However, the process, which largely depends on the discretion of judges, should be guided not only by legal frameworks but also by scientific research (13). Despite this, research on eyewitness memory and metamemory in Turkey remains scarce, and no psychometric tool specific to eyewitness memory currently exists in the country. Consequently, this adaptation study is anticipated to make a significant contribution to the field of forensic psychology in terms of using the outputs of recent studies pointing to the importance of metamemory. Saravia and his colleagues have examined the contributions of developing a valid and reliable metamemory scale tailored for eyewitnesses and highlighted that it would enhance research exploring the interplay between individuals' objective evaluations of their memory, self-efficacy, and self-confidence (14). Accordingly, the present study aims to evaluate the linguistic equivalence, validity, and reliability of the Eyewitness Metamemory Scale, a contemporary tool in the Turkish language and sample.

METHODS

This study was approved by the Ethics Committee of Istanbul Nisantasi University (Decision No: 2023/41), and it was concluded that there were no ethical or scientific objections to its implementation. Saravia et al. developed the Eyewitness Metamemory Scale, a robust psychometric tool consisting of 23 items that exhibit high internal consistency (14). The scale is structured around three distinct factors, reflecting its comprehensive approach to assessing

metamemory in eyewitness contexts. Initially, the research included several sub-phases, such as identifying a pilot group, modifying the scale according to a thorough study plan for linguistic equivalence, and finalizing the process with validity and reliability assessments. The investigations related to analysis are elaborated in the subsequent sections. The pilot group consisted of 20 individuals who were administered the original version of the scale before initiating the linguistic equivalence process.

1.1 Statistical Analysis

Linguistic Equivalence Analysis (Part 1)

The Turkish translation of the scale items and linguistic equivalence stages that were applied to are detailed below.

Stage 1: Scale items were translated into Turkish by translator A who is an expert in the field and translator E who engages in other fields of translations.

Stage 2: Two translations belonging to translators A and E were scored by other expert translators S and F at the end of which the intraclass correlation analysis between the scores indicated inconsistency as detailed in Table 1. (A: .408) (E: -.364)

Stage 3: The translations were revised by taking the scores collected from S and F into consideration for analysis.

Stage 4: Upon completing the revision, the translation was reduced to a single form. The translation which was reduced to a single form was re-scored by a total of 4 translators, both by S and F, the translators who had previously scored the translation, and additionally by G and N, 2 separate experts. As a result of the intracorrelation analysis performed after the scoring, the translators' scores were found consistent as indicated in Table 2 (.940).

Stage 5: After achieving a high correlation score for the final form of the translation, each translator's scoring was averaged. Thus, it was observed that the translators' ratings (out of 5) were high and applicable as displayed in Table 3.

Stage 6: Each item was averaged separately. The mean of all other items was high and quite close to 5 points. Since high averages were obtained for all items, the final version of the items was accepted.

Stage 7: At this stage, the Turkish comprehensibility of the scale was assessed. The translations, which were reduced to a single form, were scored by 4 Turkish language experts P, G, T and E, but the intraclass correlation between the experts was primarily found inconsistent (.292) as displayed in Table 4. Thereupon, the changes suggested by the experts were made and the translation was analysed again in terms of its suitability to Turkish language.

Stage 8: Upon the revision of the scale in line with the suggestions of experts in the field of Turkish language, it was re-scored by 2 experts T and E (T: 4.91 E: 4.86). The expert evaluations in the final form of the scale were found to be highly compatible (.879) as indicated in the Table 5 and the revised version of the scale was accepted as the final version.

Stage 9: The comprehensibility of all statements in the scale titles and items were evaluated. In order to test the linguistic equivalence of the scale, the pilot group were administered the new Turkish form of the scale at four-week intervals. The pilot group of 20 participants, representing the population as well as being as heterogeneous as possible in terms of biopsychosociodemographic characteristics, answered the scale questions and rated the Turkish comprehensibility of the scale titles and items on a scale of 1 (not comprehensible at all) to 5 (completely comprehensible). In the analysis phase, firstly, the average of the ratings of the participants in the pilot sample was taken for each item separately, and then the average of these averages was calculated at the end of which an overall comprehensibility average was obtained. According to the results of the analysis, all items were found to be comprehensible (4.72 out of 5).

Stage 10: Following the language equivalency process and adaptation of the scale, the adapted Turkish version was answered by the pilot group. A Wilcoxon Signed Ranks Test

Table 1. Intraclass Correlation Coefficient 1

Translators	Intraclass Correlation[b]		95% Confidence Interval		F Test			
			Lower Bound	Upper Bound	Value	df1	df2	Sig
A	Single Measures	.256	-.158	.597	1.690	22	23	.110
	Average Measures	.408	-.376	.748	1.690	22	23	.110
E	Single Measures	-.154	-.521	.264	.733	22	23	.765
	Average Measures	-.364	-2.173	.418	.733	22	23	.765

Table 2. Intraclass Correlation Coefficient 2

	Intraclass Correlation[b]	95% Confidence Interval		F Test			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.796	.665	.894	16.579	23	72	.000
Average Measures	.940	.888	.971	16.579	23	72	.000

was conducted to compare the scores of the English (ENG) and Turkish (TR) versions of the scale across 23 paired items. The results indicated that there were no statistically significant differences between the paired scores, with p-values for all comparisons being greater than 0.05 (e.g., TR1-ENG1: Z = 0.000, p = 1.000; TR7-ENG7: Z = -1.000, p = 0.317; TR8-ENG8: Z = -1.342, p = 0.180). These findings suggest that the Turkish translation of the scale is consistent with the original English version in terms of response patterns.

Stage 11: Following this phase, the back translation process was initiated for the scale with a high degree of comprehensibility. The scale was back-translated independently by two translators who were familiar with the original language of the scale and different from the translators participated to the Turkish translation phase. The back-translation process of the scale involved translating all items from the original language into the target language and then independently translating them back into the original language to ensure accuracy and cultural relevance (15). This method allowed for a thorough comparison of the original and back-translated versions to identify any discrepancies or contextual differences. After careful evaluation, all items were deemed applicable, confirming that the scale retained its intended meaning, linguistic equivalence, and conceptual consistency across both languages. This process ensured the validity and reliability of the scale for use in the target cultural and linguistic context. The final version of the adapted scale was conducted to 201 participants and the demographic characteristics are listed below.

The study participants consisted predominantly of women, with a diverse range of ages, though most were younger adults. Educationally, the majority had completed university degrees, with a significant number holding postgraduate qualifications. A smaller proportion had high school or primary education. These demographic details provide insight into the composition of the sample, setting the stage for the findings on the linguistic equivalence, validity, and reliability of the Eyewitness Metamemory Scale.

Table 3. Mean Scores of the Items

Translator	Mean of Items
F	4.91
N	4.95
S	4.95
G	4.95

Factor Analysis (Part 2)

Reliability Analysis

Cronbach's alpha coefficient was analyzed for the reliability of the Eyewitness Metamemory Scale. Cronbach's alpha coefficient was calculated as .70.

Validity Analysis

Confirmatory Factor Analysis (CFA)

For confirming the construct validity of the questionnaire, a confirmatory factor analysis (CFA) process was initiated by using the factors of the original questionnaire. In the CFA analysis process, as the factor loads were found to be significant with regard to the model – data fit indicators, no modification was necessitated for the items (16, 17). The model-data fit indicators indicated the following results as in $X^2/sd = 540/9.2 = CFI\ .99 \geq .90$, TLI = .89, RMSEA = .83.

The confirmatory factor analysis (CFA) results for the Turkish adaptation of the Eyewitness Metamemory Scale indicated a well-structured model with three latent factors (F1, F2, F3), each representing distinct dimensions of metamemory. Factor F1 included items m1 through m10, reflecting one aspect of the construct, while F2 comprised items m19 through m23, representing another dimension. Factor F3, consisting of items m11 through m18, captured the remaining aspect of metamemory. Each item showed strong factor loadings on its respective latent construct, as indicated by the one-directional arrows linking the factors to the observed variables (m1–m23). The circular error terms (e1–e23) associated with each observed variable accounted for residual variances, ensuring that measurement errors were addressed. Additionally, bidirectional curved arrows between the latent factors (F1, F2, F3) highlighted the correlations among the three dimensions, suggesting interrelated yet distinct components of the metamemory construct. These findings confirm the scale's validity in capturing the multidimensional nature of eyewitness metamemory in the

Table 4. Intraclass Correlation Coefficient 3

	Intraclass Correlation[b]	95% Confidence Interval		F Test			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.094	-.066	.334	1.413	22	69	.140
Average Measures	.292	-.330	.667	1.413	22	69	.140

Table 5. Intraclass Correlation Coefficient 4

	Intraclass Correlation[b]	95% Confidence Interval		F Test			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.784	.553	.903	8.238	21	22	.000
Average Measures	.879	.712	.949	8.238	21	22	.000

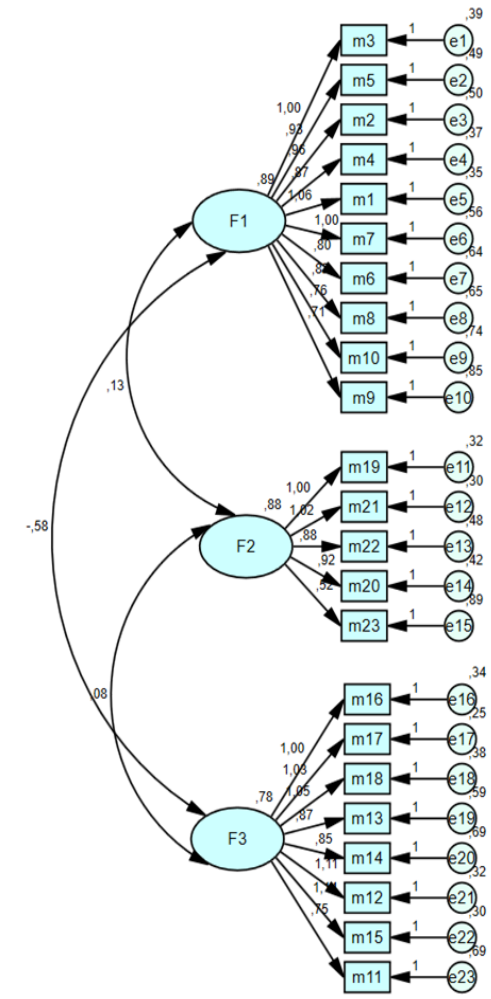

Figure 1. CFA standard coefficients of the Eyewitness Metamemory Scale

Table 6. Demographic Characteristics of the Participants

	n	%
Gender		
Woman	143	71,1
Man	58	28,9
Age		
25 and below	99	49,3
26 - 35 ages	68	33,8
36 - 49 ages	30	14,9
50 and above	4	2,0
Educational level		
Primary	1	5
High school	11	5,5
University	115	54
Postgraduate	74	36,8
Total	201	100,0

Table 7. Confirmatory Factor Analysis Fit Indices

X^2	df	X/df^2	RMSEA	CFI	NFI	TLI	IFI	RFI	SRMR
540	227	0.00	.083	.90	.84	.89	.90	.82	.08

Turkish context.

Table 7 indicated a good fit value of indicators, and the model was accepted as being robust. No item was removed from the scale; therefore, no modification was necessitated. The confirmatory factor analysis results demonstrated acceptable model fit indices for the Turkish adaptation of the Eyewitness Metamemory Scale. The chi-square value (χ^2) was 540 with 227 degrees of freedom, and the chi-square to degrees of freedom ratio (χ^2/df) indicated a good fit. The RMSEA was 0.083, which falls within the acceptable range, reflecting reasonable model fit (16). The CFI was 0.90, and the IFI also scored 0.90, indicating adequate model fit (18). The TLI was slightly below the threshold at 0.89, while NFI and RFI were 0.84 and 0.82, respectively, showing room for improvement (16). Finally, the standardized root mean square residual (SRMR) was 0.08, confirming the overall model's fit to the data. These fit indices collectively suggest that the adapted scale is a valid and reliable tool for measuring the targeted constructs in the Turkish population.

RESULTS

To adapt the Eyewitness Metamemory Scale into Turkish, permission was first secured from the original authors. Four bilingual experts translated the English version into Turkish, and these translations were synthesized into a single draft. This preliminary Turkish version was assessed for linguistic clarity by four academicians specializing in Turkish Language and Literature. Subsequently, the revised version underwent evaluation by eight experts—four in English and four in Turkish—for both linguistic and conceptual equivalence. To test its comprehensibility, the finalized scale was administered to a pilot group of 20 participants who had previously completed the original version, confirming its clarity based on the findings. The back-translation process was then completed, and the scale was finalized. The construct validity and similar scale validity of the scale, whose validity level was measured using exploratory and confirmatory factor analyses, were then examined. The reliability of the scale was analysed using Cronbach's alpha coefficient. The data of the study were analysed with SPSS 24.0 software.

The Turkish adaptation of the Eyewitness Metamemory Scale in Part 2 demonstrated acceptable reliability and validity. The scale showed a Cronbach's alpha of .70, indicating adequate internal consistency. Confirmatory Factor Analysis (CFA) supported the three-factor structure of the original scale, with strong factor loadings across all items (m1–m23) and no need for item removal or modification. Model fit indices such as CFI (.90), IFI (.90), and SRMR (.08) indicated an overall acceptable fit, though TLI (.89), NFI (.84), and RFI (.82) suggested minor areas for improvement. These results confirm that the scale is a valid and reliable instrument for assessing eyewitness metamemory in the Turkish context.

DISCUSSION

Metacognition has been extensively studied in relation to text comprehension, problem solving, reasoning, and recall, with strong evidence supporting its connections to these cognitive processes. It has also been closely tied to the concept of metamemory, which refers to individuals' awareness and understanding of their memory, including how they remember and how memory processes operate. Metamemory encompasses the processes through which individuals evaluate, reflect upon, and make judgments about the content and functioning of their memories, both prospectively and retrospectively, distinguishing itself from memory by focusing on the assessment and interpretation of memory rather than the act of remembering itself (19). Since metamemory involves an individual's perception of their own memories and recall abilities, research in this field offers valuable insights into how people interpret and regulate their cognitive perceptions.

Eyewitness memory, metamemory, and memory distortions are interconnected, as metamemory governs an individual's awareness and regulation of their recall processes, which can influence the accuracy of eyewitness memory and either mitigate or exacerbate the impact of memory distortions. For instance, a study by Shapira and Pansky found that the accuracy of eyewitness accounts declined over time, primarily due to reduced monitoring effectiveness, a key component of metamemory, and this result suggests that the ability to assess and regulate one's memory processes is vital for maintaining the reliability of eyewitness testimony (20). Eyewitness memory is highly susceptible to distortions, as misleading information and cognitive biases can alter the accuracy of recall and recognition, leading to false memories or inaccuracies in testimony. A study investigating the post-event misinformation (PEI) for eyewitnesses indicated that memory distortions are influenced by whether the misleading information belongs to the same category as the original event and the strength of this relationship (21). Therefore, the same study highlighted that for a witness to accept the PEI in place of the original event, it appears sufficient for the meaning of the original event to be preserved, and a connection established between its meaning and the PEI. It was recommended that studies examining the impact of PEI on eyewitness testimony should consider the semantic connection between the PEI and the original event, as well as the strength of this connection, as it significantly influences the accuracy of recognition and identification.

Moreover, incorporating metamemory assessments into eyewitness procedures can provide valuable insights into the confidence-accuracy relationship, enabling investigators to better interpret the reliability of eyewitness identifications. The adaptation of the Eyewitness Metamemory Scale into Turkish

fills a critical gap in the field of forensic psychology in Turkey, where studies on eyewitness memory remain limited, and no psychometric tools specific to eyewitness metamemory have been previously developed. Eyewitness memory plays a vital role in criminal justice, as it encapsulates the recollections of individuals who have witnessed or been involved in crimes. However, as previous studies highlight, eyewitness memory might inherently be fallible and susceptible to post-event information, which can distort the accuracy of recollections (7, 9). Conversely, a strong metamemory has the potential of being accurate. This underscores the importance of tools like the Eyewitness Metamemory Scale, which delve into individuals' awareness and perceptions of their memory processes.

In this study, the scale adaptation process adhered to rigorous methodological standards to ensure linguistic equivalence, cultural relevance, and psychometric reliability. The translation process, which involved four bilingual translators and multiple rounds of expert evaluations, ensured that the scale maintained its original meaning and comprehensibility in the Turkish context. Moreover, the back-translation process and testing with an adult sample further validated its applicability. Given the critical role of metamemory in understanding how individuals perceive and evaluate their memory capabilities, this adaptation provides a robust tool for future studies exploring the relationship between eyewitness metamemory, self-efficacy, and confidence in the Turkish population. This scale's introduction into Turkish forensic psychology is expected to contribute significantly to research and practice by offering a scientifically validated tool to study eyewitness metamemory. By enabling reliable assessments of how individuals perceive and evaluate their memory after witnessing a crime, the scale has the potential of supporting efforts to understand the dynamics of eyewitness testimonies in a better way. Moreover, it underscores the importance of integrating scientific tools into judicial processes to ensure more accurate and reliable use of eyewitness evidence in Turkey. The Eyewitness Metamemory Scale, therefore, not only contributes to the academic study of forensic psychology but also has practical implications for improving the reliability of eyewitness testimonies in the legal system.

CONCLUSION

The adaptation of the Eyewitness Metamemory Scale to the Turkish language has successfully established a reliable and valid instrument for assessing memory awareness in eyewitness contexts. Through a rigorous translation and cultural adaptation process, the Turkish version of the scale not only retains the original's structural integrity but also demonstrates strong internal consistency and robust construct validity. The identification of three distinct factors aligns with prior research, reinforcing the scale's theoretical framework. This study contributes significantly to the field by providing a valuable resource for both researchers and practitioners in Turkey, facilitating the exploration of eyewitness memory phenomena in diverse contexts. Future studies should aim to expand the scale's application across various demographic groups and settings, enhancing our understanding of memory processes within the Turkish-speaking population.

LIMITATIONS OF THE STUDY

One limitation of this study is the relatively small and homogeneous sample size, which may restrict the generalizability of the findings to broader or more diverse populations. Additionally, the study relied solely on self-report measures, which can be subject to biases such as social desirability or inaccurate self-assessment. Future research should consider including a larger, more diverse sample and incorporating behavioral or performance-based measures to further validate the scale's effectiveness across different contexts and populations.

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Conflict of Interest

The authors declare that they have no conflict of interests regarding content of this article.

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Ethical Declaration

This study was approved by the Ethics Committee of Istanbul Nisantasi University (Decision No: 2023/41), and it was concluded that there were no ethical or scientific objections to its implementation. Additionally, and Helsinki Declaration rules were followed to conduct this study.

Authorship Contributions

The author conducted the entire study independently, including the design, data collection, analysis, and manuscript preparation.

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