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Adaptation of the Knowledge about Childhood Autism among Health Workers (KCAHW) Questionnaire aimed for Usage in Turkey

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ABSTRACT

OBJECTIVE: Many checklists and scales have been developed in order to diagnose the autism spectrum disorder in childhood. Nevertheless, self-applied questionnaires/scales that can be filled out by health professionals for assessing their knowledge and consciousness of this disorder are still limited. The Knowledge about Childhood Autism among Health Workers self-administered survey was developed by Bakare et al. in 2008. This survey was recruited by many study groups in developing countries. In these countries, the knowledge regarding childhood autism is inadequate within community healthcare professionals.

METHODS: In our study, the agreed-upon Turkish version of the questionnaire was distributed to the 61 primary care physicians working in Maltepe District of Istanbul Province for the purpose of adaptation and validation.

RESULTS: The internal consistency coefficient (Kuder-Richarson coefficient of reliability-KR20) of the measurements attained from the Turkish version of the questionnaire was 0.70. In addition, the split- half reliability analysis demonstrated that Guttman Split-half value was 0.84. According to the principal factor analysis of tetrachoric correlation matrix, the three factors with highest Eigenvalues were associated with 1.Relatively easy clinical observations, 2.The signs which require a longer observation time and detailed anamnesis, and 3. The signs, which require detailed examination and observation. The factors explained cumulatively 65.98% of total variance.

CONCLUSION: According to this study, the questionnaire is a valid measure for Turkish society.

Keywords: Awareness; childhood autism; physicians; primary care; validity.

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Autism spectrum disorder (ASD) defines a neurodevelopmental disorder cluster. ASD mainly interferes with social interaction and communication [1–3], but through early diagnosis and special treatment, children with ASD are able to attend school and participate in social activities with their peers [1–3]. ASD was first suspected of being caused by parental neglect; however, it is now accepted that the disorder is caused by neurobiological factors with increasing prevalences [4–7]. Several surveys have demonstrated that the diagnosis of ASD in children can be as late as 5 or 6 years of age [8, 9].

Sufficient knowledge and awareness regarding childhood ASD in healthcare professionals can ensure early recognition of children with ASD, and this enables early

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intervention [10–12]. The deficiencies related to ASD display before age 36 months. Initial healthcare workers, who interrelate with the child and his/her caregivers via routine pediatric examinations [10–12], are usually primary care/family medicine doctors, and pediatricians. Furthermore, a multidisciplinary approach is recommended not only for early recognition but also for referral, family guidance, and follow-up of ASD in communities [13]. Early identification of childhood autism is not an easy task in primary care settings, because of the lack of pathognomonic signs and laboratory tests for diagnosis [14]. Therefore, health professionals have to identify autism in a child by the presence of symptomatic patterns [14].

In recent years, many checklists and scales have been created for childhood ASD diagnosis [15–17], and most of these instruments are applied via interviews with the caregivers of children; however, self-applied questionnaires/scales that can be filled out by health professionals for assessing the knowledge and awareness of childhood ASD are still limited.

The Knowledge about Childhood Autism among Health Workers (KCAHW) self-administered survey was developed by Bakare et al. in 2008. This survey was recruited by many study groups in developing countries. In these countries, the knowledge regarding childhood autism is inadequate within community healthcare professionals [18–21]. In Bakare's study, the sample comprised 50 psychiatric nurses employed by Federal Neuro-Psychiatric Hospital, Enugu (FNHE) in Nigeria. The participating nurses were the healthcare workers most likely to attend patients with ASD and continuing to administer primary healthcare services [18]. The KCAHW questionnaire/scale was applied to 50 consenting psychiatric nurses twice, with a 2 week interval. [18]. The questionnaire was a self-administered and composed of 19 questions [18]. The KCAHW survey was separated into 4 domains that addressed deficiencies in social interaction, deficiencies in communication and language development, the form of obsessive/compulsive behavior pattern, and type of childhood autism disorder [18]. The Cronbach's alpha value was 0.97 and adequate on the basis of Nunnaly's reference [18].

Since we could not obtain a validated self-administered questionnaire on knowledge of autism in childhood in primary healthcare professionals in Turkey, we designed our study to translate and validate the KCAHW questionnaire. Thus, this methodological study aimed to include primary care physicians working in Maltepe province of the Istanbul District for the purpose of adapting the KCAHW questionnaire for use in Turkey.

MATERIALS AND METHODS

In this methodological study, 61 primary care physicians working Maltepe province of the Istanbul District in Turkey and who gave written informed consent to participate collaborated with us. Primary care physicians in Turkey are health care providers who have contact with the child and family through routine infant/toddler wellness checks. In Turkey, the primary care physicians also inform, provide support to, and refer to appropriate authorities children with developmental problems [22]. Approximately 21,175 primary care physicians work at several Family Physician Centers throughout Turkey [22]. In Maltepe province of the Istanbul District, there are 134 primary care physicians. Out of these 134 primary care physicians, 61 agreed to complete our questionnaires. The questionnaires were self-administered by the respondents within 10–15 minutes in the presence of the researchers and were collected immediately to prevent the respondents from checking any learning material or chatting with their co-workers during the appliance of the questionnaire. The researchers did not observe what the respondents wrote as the answers. The questionnaires were collected anonymously.

Ethical permission for the research was acquired from the institutional ethical committee on September 1st, 2015. The procedures of the study on human volunteers were in agreement with the institutional and national ethical norms of the research committee and in concordance with the 1964 Helsinki declaration and its subsequent revisions.

The KCAHW self-administered questionnaire developed by Bakare et al. in 2008 formed the basis of our questionnaire. On July 15, 2015, we received permission to adapt the KCAHW questionnaire. Some questions of the KCAHW questionnaire were used previously by the researchers to assess awareness regarding autism of nursing school and medical faculty undergraduates in Istanbul, Turkey [23].

Questions to determine the socio-demographic characteristics (age, sex, and marital status) of the respondents were added to the KCAHW questionnaire by the researchers.

Each item had three choices, with only one correct

answer. While the correct choice of each question was worth for 1 point, and the other two choices were assigned as 0 point.

The KCAHW questionnaire had four domains and 19 questions (items). The fourth domain contained six questions that addressed data regarding childhood autism disorder types. While translating and validating the KCAHW questionnaire in Turkish, after taking the permission of Dr. Muideen Owolabi Bakare via e-mail, the researchers decided not to include Domain 4 to avoid misunderstandings of the physicians about ASD. To this end, the Turkish version contained 13 questions (items). Since all 61 participants gave full and correct answers to question (item) 1, this question was also removed, so the Turkish version comprised 12 questions (items). As in the original KCAHW questionnaire, each of the questions (items) in the Turkish version had three choices with one correct answer. The correct choice of each question (item) was worth for a 1 point, and the two other choices were assigned a score of 0 each. Consequently, a participant could have a score ranging from 0 to 12. In our study, the minimum obtainable score was demonstrated to be 5 and the maximum score to be 12.

Domain 1

Composed of eight items which focuses on the deficiencies in social interactions frequently detected in children with autism. The score obtainable from this domain ranged from 0 to 8.

Domain 2

Composed of only one item which focuses on deficiencies in communication and development of language. Those constitute a part of symptoms which present in children with autism. The score obtainable from this domain ranged from 0 to 1.

Domain 3

Composed of four items, which focused the obsessive/compulsive behavior pattern found in children with autism. These behavior patterns were depicted as repetitive, stereotypical or restricted. The score obtainable from this domain ranged from 0 to 4.

The questionnaire was first translated into Turkish by one of the researchers and was then controlled and translated again by two professional translators. Subsequently, the questionnaire was checked by two public health experts, and the Turkish version that best explained each question and answers (items) was selected. The accepted Turkish version of the questionnaire was controlled by an expert in Child and Adolescent Psychiatry and corrected. From thereon, the Turkish version was translated again to English language by a native language expert. Ten Turkish physicians who had an excellent command of English and worked in the field of Public Health filled out the last Turkish version, the original English version, and the final English version and agreed that all three versions gave the same meaning for each question (item). The agreed-upon version of the questionnaire was then distributed to the 61 primary care physicians working in Turkey for the purpose of adaptation and validation in July 2016.

Statistical Analysis

For the statistical analysis, Stata 15.1 software (StataCorp, 4905 Lakeway Drive College Station, Texas 77845 USA) was used. Kuder-Richarson coefficient of reliability (KR-20) value was recruited to investigate the reliability of the questionnaire by measuring internal consistency which is advised to use binary data [24]. The split-half method was also applied. The differences in the mean values of the scale for independent groups were calculated with Student's t-test, p value of <0.05 was interpreted as statistically significant. In addition, the correlations between dichotomized scale items were assessed via tetrachoric correlation analysis and a factor matrix was obtained. This tetrachoric correlation matrix was further analyzed with factor analysis, in which the three factor with highest Eigenvalues were retained. The factors were rotated orthogonally by using varimax rotation and rotated factor loadings were calculated.

RESULTS

The mean age of the 61 primary care physicians was 39.32±7.3. Among all of the primary care physicians, 40.35% (n=23) were males and 59.65% (n=34) were females. Regarding the marital status of the physicians, 75.44% (n=43) were currently married, 15.79% (n=9) were single, and 8.77% (n=5) were divorced/widowed. The distributions of the answers of the participants were presented in Table 1.

The internal consistency coefficient (KR-20) of the measurements attained from the Turkish version of the KCAHW questionnaire was 0.70. In addition, the split-

Table 1. The distributions of correct and false answers for the items of the knowledge about childhood autism among health workers (KCAHW) questionnaire, Turkish version

Item	Correct		False	
	n	%	n	%
1- Lack of eye contact, facial expressions, body language and gestures during social interactions	61	100	0	0
2-Failure to develop peer relationship appropriate for developmental age?	60	98.36	1	1.64
3-Lack of spontaneous will to share enjoyment, interest, or activities with other people?	51	83.61	10	16.39
4-Lack of social or emotional reciprocity?	57	93.44	4	6.56
5-Staring into open space and not focusing on anything specific?	47	77.05	14	22.95
6-The child can appear as if deaf or dumb?	48	78.69	13	21.31
7-Loss of interest in the environment and surroundings?	56	91.8	5	8.2
8-Social smile is usually absent in a child with autism?	45	73.77	16	26.23
9-Delay or total lack of development of spoken language?	48	78.69	13	21.31
10-Stereotypical and repetitive movement (e.g. hand or finger flapping or twisting)?	52	85.25	9	14.75
11-May be associated with abnormal eating habit?	30	49.18	31	50.82
12-Persistent preoccupation with parts of objects?	54	88.52	7	11.48
13-Love for regimented routine activities?	28	45.9	33	54.1

Table 2. Total item correlations of the Knowledge about childhood autism among health workers (KCAHW) questionnaire, Turkish version

Question (item)	Tetrachoric item correlations	p	Item-rest correlation
2-Failure to develop peer relationship appropriate for developmental age?	1	0.4262	0.1467
3-Lack of spontaneous will to share enjoyment, interest, or activities with other people?	0.75	**0.0013***	0.3979
4-Lack of social or emotional reciprocity?	1	**0.0286***	0.3834
5-Staring into open space and not focusing on anything specific?	0.64	**0.0043***	0.3593
6-The child can appear as if deaf or dumb?	0.83	**0.0001***	0.4812
7-Loss of interest in the environment and surroundings?	0.51	0.1536	0.2746
8-Social smile is usually absent in a child with autism?	0.89	**<0.001***	0.4868
9-Delay or total lack of development of spoken language?	0.60	**0.0096***	0.5039
10-Stereotypical and repetitive movement (e.g. hand or finger flapping or twisting)?	1	**0.0002***	0.2528
11-May be associated with abnormal eating habit?	0.66	**0.0007***	0.2884
12-Persistent preoccupation with parts of objects?	0.63	**0.0354***	0.2187
13-Love for regimented routine activities?	0.68	**0.0006***	0.1682

*The marked p values shows statistically significant correlation. The total score was dichotomized according to the median value. The items were correlated with total item score (low or high) using tetrachoric analysis.

half reliability analysis demonstrated that Guttman Split-half value was 0.84 (lambda 4).

When the total item correlations of the Turkish version of the KCAHW questionnaire were calculated, all correlations except Item 2 and 7, was found statistically significant ($p<0.05$), and their correlation coefficients were ranging from 0.597 to 1.0. All items showed positive correlation with the sum of the scale score. Alpha values calculated after deleting the item ranged between 0.64-0.71 (Table 2).

In the factor analysis of tetrachoric correlation matrix, factor 1, which has with highest Eigenvalue of 3.28; was

Table 3. Factor analysis of tetrachoric correlation matrix*

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	3.27967	0.72840	0.2733	0.2733
Factor 2	2.55127	0.46427	0.2126	0.4859
Factor 3	2.08700	–	0.1739	0.6598

*For the factor analysis, principal factors method was used. The number of observations were n=61, and the number of retained factors were designated as n=3, which was found as the optimum number of factor by considering Eigenvalues, explanatory properites and factor loadings. Orthogonal varimax rotation was recruited after the appliance of principal factor analysis.

Table 4. Factor loadings and uniqueness of scale items

Item number*	Factor 1	Factor 2	Factor 3	Uniqueness
2	0.0488	**0.9863**	0.0067	0.0249
3	**0.7066**	0.3930	0.0540	0.3433
4	**0.6596**	-0.2840	-0.5072	0.2271
5	0.5392	**-0.5909**	0.0832	0.3532
6	**0.7373**	0.3182	0.0056	0.3550
7	0.4616	-0.3526	**0.5999**	0.3028
8	**0.7100**	-0.3513	0.0524	0.3697
9	**0.7715**	0.2084	0.1553	0.3373
10	0.2726	-0.2566	**-0.8114**	0.2014
11	**0.5274**	0.2887	-0.2617	0.5700
12	0.1296	-0.2242	**0.7547**	0.3633
13	0.3125	**0.4597**	0.2384	0.6342

*Item 1 was excluded from the analysis, since all the participants responded with the same answer (correct). The factor loading of items, which are marked "bold" indicates the highest factor loading to the related factor.

followed by factor 2 and factor 3, which had the Eigenvalues of 2.55 and 2.09, respectively. The combination of three factors explained 65.98% of total variance. Factor 1 explained 27.33% of total variance and its factor loadings ranged from 0.02 and 0.81. Factor 2 contributed to the explanation of 21.26% of total variance and factor loadings were between -0.84 and 0.76. Finally, factor 3 explained an additional 17.39% of total variance and its factor loading was between -0.81 and 0.75. The uniqueness of scale items ranged between -0.68 and 0.88 (Table 3).

According to the tetrachoric matrix factor analysis, items with highest factor loadings for Factor 1 were "Lack of spontaneous will to share enjoyment, interest, or activities with other people?", "Lack of social or emotional reciprocity?" "The child can appear as if deaf or dumb?", "Delay or total lack of development of spoken language?", "May be associated with abnormal eating habit?" "Social smile is usually absent in a child with autism?" The items loaded to Factor 1 were relatively easy to observe and give strong clues for diagnosis of autism.

Factor 2 had items with strong positive and negative factor loadings including "Failure to develop peer relationship appropriate for developmental age?"," Staring into open space and not focusing on anything specific","Love for regimented routine activities?" The items loaded to Factor 2 were related to the observations, which requires relatively a longer time period to be evaluated by the healthcare professional. A detailed anamnesis is vital for the detection of the items loaded to the Factor 2.

Similarly, Factor 3 had items with strong positive and negative factor loadings, including "Loss of interest in the environment and surroundings?" "Persistent preoccupation with parts of objects?" and "Stereotypical and repetitive movement (e.g., hand or finger flapping or twisting)?". This factor was concentrated on both social and behavioral aspects of autism, which require careful clinical examination by the physician (Table 3–5).

Discussion

Our research provided proof for adaptation of the KCAHW to Turkish language in terms of reliability and validity of questionnaire. Taking into consideration the factor loads of the items, explained variance rates, and eigenvalues, the scale showed good variability.

The KCAWH has been prepared especially for the purpose of determining awareness of ASD not for diagnosing ASD [25–29]. In our study, we kept in mind that the health workers conducting well-baby clinics/healthy child check-ups should be aware of behavioral changes so that they can recognize and make timely referral of ASD to appropriate health authorities. It is also known that early detection and intervention are necessary to minimize the negative effects of ASD [30–32].

Kuder-Richarson coefficient of reliability, Guttman Split-half values and Item-rest correlations were used for internal consistency control of the measure. The Kuder-Richarson coefficient of reliability is an indicator for internal consistency and homogeneity of the components in the measure. A reliability coefficient that is considered to be adequate for the scale should be near to 1 as feasible.

Table 5. The distribution of items to the factors

Factor 1	Factor 2	Factor 3
Item 3: Lack of spontaneous will to share enjoyment, interest, or activities with other people?	**Item 2:** Failure to develop peer relationship appropriate for developmental age?	**Item 7:** Loss of interest in the environment and surroundings?
Item 4: Lack of social or emotional reciprocity?	**Item 5:** Staring into open space and not focusing on anything specific?	**Item 10:** Stereotypical and repetitive movement (e.g. hand or finger flapping or twisting)?
Item 6: The child can appear as if deaf or dumb?	**Item 13:** Love for regimented routine activities?	**Item 12:** Persistent preoccupation with parts of objects?
Item 8: Social smile is usually absent in a child with autism?		
Item 9: Delay or total lack of development of spoken language?		
Item 11: May be associated with abnormal eating habit?		

It has been previously suggested that values >0.50 indicated that a scale is appropriate for use, but values ≥0.70 are better [33]. In our study, the measure displayed good reliability with a value of 0.70.

The Guttman split-half coefficient was computed as another measure to assess internal consistency. The computational formula is based on Cronbach's alpha value related to two components and inserts the covariance among the totals of components of two groups and the variance averages of the group totals. After division to facilitate that each group holds highly correlated items inside the groups, without being correlated between them, the split-half coefficients would be near to their minimum values. Once components with high correlation are coupled and segregated into distinct clusters, the split-half coefficients would achieve their maximum [34]. In our study, Guttman split-half coefficient was found as 0.843 and considered as satisfactory.

In previous studies, the anticipated internal consistency limits of the scales are determined according to the scores for item-total-item correlation and value of Cronbach alpha for reliability, which are higher than 0.25 and 0.50, respectively [35–37]. The internal consistency analysis of Bakare et al. (2008) on the original scale (KCAHW) was evaluated by using Cronbach alpha reliability coefficients of 0.92 and 0.97 [38]. In our study, item-rest correlation (Corrected Item-Total Correlation) value for the test was 0.3301 and ranging from 0.1467 to 0.5039 for each item. According to the item-rest correlation of the test value, the scale was considered as consistent.

In this study for investigation of the validity of the structure, we found that the factor structure obtained by the factor analysis of the data obtained by using the varimax rotation method, which is consistent with theory and the literature [39]. According to this, the KCAHW is a valid measure for Turkish society.

The structure of item loadings to factors was found different than Bakare et al. In our analysis rather than factor structure was composed of deficiencies in social interactions, obsessive/compulsive behavior, deficiencies in communication and development of language our factors revealed as 1. Relatively easy clinical observations, 2. The signs which require a longer observation time and detailed anamnesis, and 3. The signs, which require detailed examination and observation. We couldn't conduct confirmatory factor analysis because of relatively small sample size.

Adaptation of this scale to the Turkish population is important because the scale may contribute to improvement of health workers' awareness and knowledge about autism and play a vital part in early identification and referral of children with ASD. The Modified Checklist for Autism in Toddlers (M-CAT), which is recruited worldwide as a screening test for autism, has been adapted for Turkey by Kara et al. [40]. The M-CAT scale will also increase awareness and facilitate early diagnosis in primary health care workers who may use such screening studies.

Study Limitations

Of the original scale, 12 out of the 19 questions were used for adapting it to Turkish. Another limitation of this study is that test–retest reliability was not assessed, since KR20 and Guttman Split-half values were found satisfactory [41]. Finally, the original scale of Bakare et al. was developed on psychiatric nurses, as a class of healthcare workers, however we recruited for this research the primary care physicians.

Conclusion

The measure in our study showed a moderately high Kuder-Richarson coefficient of reliability, but possessed a higher Guttman split-half coefficient and moderate item-rest correlation coefficients. Thus, the Turkish adaptation of KCAWH scale showed a high internal consistency. In addition, the items of the scale loaded three distinctive factors, which reflect the diagnostic capabilities and awareness of healthcare workers. The Turkish adaptation of KCAWH scale is found quite valid tool for use in public health and clinical practice.

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Ethics Committee Approval: Ethical permission for the research was acquired from the institutional ethical committee on September 1st, 2015. The procedures of the study on human volunteers were in agreement with the institutional and national ethical norms of the research committee and in concordance with the 1964 Helsinki declaration and its subsequent revisions.

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Appendix 1:

Knowledge about Childhood Autism among Health Workers (KCAHW) Questionnaire in Turkish Language

SAĞLIK ÇALIŞANLARININ ÇOCUKLUK OTİZMİ KONUSUNDAKİ BİLGİ DÜZEYİ ANKETİ

Yaş:	Cinsiyet:	Mezuniyet yılı:	Medeni durum:	Çocuk sayısı:

Çocukluk çağı otizmi olan bir çocuğu en iyi aşağıdaki davranışlar tarif eder:

A1	Sosyal iletişim kurarken göz teması, yüz ifadesi, vücut duruşu ve jestler gibi birçok sözel olmayan ifadelerin kullanımında belirgin eksiklik?	E	H	B
A2	Gelişimsel yaşına uygun düzeyde akran ilişkileri kurmada başarısızlık?	E	H	B
A3	Başkalarıyla oyun, oyuncak, eğlence, ilgi odağı ya da diğer aktiviteleri kendiliğinden paylaşma konusunda gönülsüzlük?	E	H	B
A4	Sosyal ya da duygusal açıdan karşılıklı ilişkide yetersizlik?	E	H	B
A5	Zaman zaman / her zaman özel bir nesneye odaklanmadan boşluğa ya da uzaklara doğru gözleri dalar mı?	E	H	B
A6	Çocuk dışarıdan gözlendiğinde işitme ya da konuşma engelli olarak görülebilir mi?	E	H	B
A7	Çevresine ve etrafındakilere karşı genellikle ilgisizdir ya da yaşıtlarına göre daha az ilgilidir?	E	H	B
A8	Otizmli bir çocukta sosyal gülümseme genellikle yoktur?	E	H	B
B9	Konuşma dilinin gelişiminde gecikme vardır ya da konuşma hiç yoktur?	E	H	B
C10	Kalıplaşmış (stereotipik) ya da tekrarlayan hareketler (örneğin el ve parmak çırpma veya bükme) yapabilir?	E	H	B
C11	Normalden farklı yeme alışkanlıkları bulunabilir?	E	H	B
C12	Bir nesnenin bütününden daha çok parçası/parçalarıyla sürekli meşgul olabilir?	E	H	B
C13	Kurallı ve rutin aktiviteleri çok sevebilir?	E	H	B
D14	Otizm çocukluk çağı şizofrenisidir?	E	H	B
D15	Otizm otoimmün bir durumdur?	E	H	B
D16	Otizm nörogelişimsel bir bozukluktur?	E	H	B
D17	Otizm zekâ geriliği ile ilişkili olabilir?	E	H	B
D18	Otizm epilepsi ile ilişkili olabilir?	E	H	B

Lütfen sorulara cevap vermek için ders kitaplarına başvurmayınız. Zaman ayırdığınız için teşekkürler.

D19. Çocukluk otizminin başlangıç yaşı genellikle hangi dönemdedir?

(A) neonatal (yenidoğan) dönemdedir,

(B) infant (bebeklik) dönemdedir,

(C) çocukluk çağındadır

E20. Türkiye'de otizm ve diğer gelişimsel bozukluklara sahip çocukların multidisipliner akımını sağlayan ve mediko-sosyal ihtiyaçlarını karşılayan sağlık kurumları veya tesisler var mıdır?

(A) EVET (B) HAYIR

Lütfen seçiminiz için açıklama yapınız ve gerekirse örnek veriniz

_____
_____

E21. Türkiye'de çocukluk çağı otizmi ve diğer gelişimsel bozuklukları olan çocukların topluma kazandırılması için multidisipliner yaklaşımda rol almak isteyen tüm profesyoneller için eğitim olanakları var mıdır?

(A) EVET (B) HAYIR

Lütfen seçiminiz için açıklama yapınız ve gerekirse örnek veriniz

_____
_____

E22. Türkiye'de otizm ya da diğer gelişimsel bozukluğu olan çocukların hak ve çıkarlarını korumaya yönelik herhangi bir kanun ya da düzenleme var mıdır?

(A) EVET (B) HAYIR

Lütfen seçiminiz için açıklama yapınız ve gerekirse örnek veriniz

_____
_____

Katıldığınız için teşekkürler.