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# Adaptation of the Knowledge about Childhood Autism among Health Workers (KCAHW) Questionnaire: Turkish version

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## ABSTRACT

**OBJECTIVE:** Many checklists and scales have been developed to diagnose the autism spectrum disorder in childhood. However, 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, 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 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. The split- half reliability analysis demonstrated that the Guttman Split-half value was 0.84. According to the principal factor analysis of the tetrachoric correlation matrix, the three factors with the highest Eigenvalues were associated with (i) Relatively easy clinical observations, (ii) the signs which require a longer observation time and detailed anamnesis, and (iii) the signs, which require detailed examination and observation. The factors explained cumulatively 65.98% of the total variance.

**CONCLUSION:** The findings obtained in this study showed that the adapted questionnaire addressed in the scope of this study 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, ASD is now accepted that the disorder that arises from neurobiological factors with increasing prevalence [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

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recognition of children with ASD, and this enables early 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]. Thus, health professionals must identify autism in a child by the presence of symptomatic patterns [14].

In recent years, many checklists and scales have been prepared for childhood ASD diagnosis [15–17], and most of these instruments are applied through 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, 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 who are most likely to attend patients with ASD and continue to administer primary healthcare services [18]. The KCAHW questionnaire/scale was applied to 50 consenting psychiatric nurses twice, with a two- week interval. [18]. The questionnaire was self-administered and composed of 19 questions [18]. The KCAHW survey was separated into four domains that addressed deficiencies in social interaction, deficiencies in communication and language development, the form of obsessive/compulsive behavior patterns, and type of childhood autism disorder [18]. The Cronbach's alpha value was 0.97 and adequate based on 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 to adapt the KCAHW questionnaire to 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 of them agreed to complete our questionnaires. The questionnaires were self-administered by the respondents within 10–15 minutes in the presence of the researchers. The questionnaires 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 this research was obtained from the institutional ethical committee on September 1st, 2015. The procedures of this 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 the 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 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) as presented in Appendix 1. Since all 61 participants gave full and correct answers to the question (item) 1, this question was also removed. Thus, 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 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 that focused 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 that focused on deficiencies in communication and development of language. The items constitute a part of the symptoms which are present in children with autism. The score obtainable from this domain ranged from 0 to 1.

### Domain 3

Composed of four items that focused on 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 into the 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, the 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 factors with the highest Eigenvalues were retained. The factors were rotated orthogonally 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 male and 59.65% (n=34) were female. Regarding the marital status of the physicians, 75.44% (n=43) of them were currently married, 15.79% (n=9) of them were single, and 8.77% (n=5) of them were divorced/widowed. The distributions of the answers of the participants are presented in Table 1.

The internal consistency coefficient (KR-20) of the measurements attained from the Turkish version of the

**Table 1.** The distributions of correct and false answers for the Items of the Knowledge about Childhood Autism among Health Workers (KCAHW) questionnaire: The 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 relationships 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-Maybe associated with abnormal eating habits? | 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: The Turkish version

| Question (item) | Tetrachoric item correlations | p | Item-rest correlation |
|---|---|---|---|
| 2-Failure to develop peer relationships 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-Maybe associated with abnormal eating habits? | 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 show a 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.

KCAHW questionnaire was 0.70. In addition, the split-half reliability analysis demonstrated that the 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 a 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 the tetrachoric correlation

**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, the principal factors method was used. The number of observations was 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 properties 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 loadings of the items, which are marked "bold" indicates the highest factor loading to the related factor.

matrix, factor 1, which has with the highest Eigenvalue of 3.28, was 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 the total variance. Factor 1 explained that 27.33% of the total variance and its factor loadings ranged from 0.02 and 0.81. Factor 2 contributed to the explanation of 21.26% of the total variance, and factor loadings were between -0.84 and 0.76. Finally, factor 3 explained an additional 17.39% of the 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?", "Maybe associated with abnormal eating habits?" "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 the diagnosis of autism.

Factor 2 had items with strong positive and negative factor loadings, including "Failure to develop peer relationships 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 require 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 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 the social and behavioral aspects of autism, which require careful clinical examination by the physician (Table 3–5).

## DISCUSSION

Our research provided proof for the adaptation of the KCAHW to the Turkish language concerning the reliability and validity of the 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 referrals of ASD to appropriate health authorities. 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 of in-

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 relationships 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:** Maybe associated with abnormal eating habits? | | |

ternal 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. 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 is higher than 0.25 and 0.50, respectively [35–37]. The internal consistency analysis of Bakare et al. (2009) on the original scale (KCAHW) was evaluated using Cronbach alpha reliability coefficients of 0.92 and 0.97 [38]. In our study, the 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 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.'s findings. 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 follows: (i) Relatively easy clinical observations, (ii) the signs which require a longer observation time and detailed anamnesis, and (iii) the signs, which require detailed examination and obser-

vation. We could not conduct a confirmatory factor analysis because of a relatively small sample size.

Adaptation of this scale to the Turkish population is important because the scale may contribute to the 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. [17]. 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 [40]. According to the factor analysis, item 5 did not distinctly loaded to Factor 2. However, this finding can be explained with the fact, that this item may be partially loaded two both factor 1 and factor 2. Further studies are needed to clarify the direction of loading of this item. Finally, the original scale of Bakare et al. was developed on psychiatric nurses, as a class of healthcare workers; however, we recruited the primary care physicians for this research.

### 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 the KCAWH scale showed 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 the KCAWH scale is found quite a valid tool for use in public health and clinical practice.

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## Appendix 1:

Adapted Knowledge about Childhood Autism among Health Workers (KCAHW) Questionnaire as Turkish-Sağlık Çalışanları Otizm Farkındalık Ölçeği (SÇOFÖ)

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 |

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