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Psychometric Properties and Factorial Invariance of the Educational-Clinical Questionnaire: Anxiety and Depression (CECAD) in Basque Population

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ABSTRACT

Background: Anxiety and depression are the most common current mental health problems. Due to their comorbidity, there is a need for instruments that measure them simultaneously. Moreover, given that their prevalence varies by gender and age, it is important to examine the factorial invariance of such instruments. The present study aimed to analyze the dimensionality and factorial invariance of the Basque version of the Educational-Clinical Questionnaire: Anxiety and Depression (CECAD) as a function of gender and age, and to gather additional evidence of its validity. **Method:** The sample comprised 2131 participants (54.2% female) between 7 and 24 years old ($M = 13.2$; $SD = 3.52$). **Results:** The CECAD was found to have a two-dimensional structure invariant to gender and age, with higher latent means for girls in both dimensions, and for those aged 14 and over in depression, but with small effect sizes. Both reliability and convergent validity values were good. **Conclusions:** The Basque version of the CECAD has good evidence of validity and reliability for assessing anxiety and depression in Basque-speaking children and adolescents.

Propiedades Psicométricas e Invarianza Factorial del Cuestionario Educativo-Clinico: Ansiedad y Depresión (CECAD) en Población Vasca

RESUMEN

Antecedentes: En la actualidad, la ansiedad y la depresión son los problemas de salud mental más comunes. Debido a su comorbilidad, resulta necesario disponer de instrumentos que los midan simultáneamente. Además, dado que su prevalencia varía en función del género y la edad, es importante examinar la invarianza factorial de tales instrumentos. El objetivo del presente estudio fue analizar la dimensionalidad y la invarianza factorial de la versión en euskera del Cuestionario Educativo-Clinico: Ansiedad y Depresión (CECAD) en función del género y la edad, y recabar evidencias adicionales de validez. **Método:** La muestra estuvo compuesta por 2131 participantes (54.2% mujeres) con edades comprendidas entre los 7 y 24 años ($M = 13.2$; $DT = 3.52$). **Resultados:** El CECAD mostró una estructura de dos dimensiones invariantes al género y la edad, con medias latentes más altas para las chicas en ambas dimensiones, y para mayores de 14 años en depresión, pero con tamaños del efecto pequeños. Tanto las estimaciones de los índices de fiabilidad como las evidencias de validez convergente fueron buenas. **Conclusiones:** La versión en euskera del CECAD posee adecuadas evidencias de validez y fiabilidad para evaluar la ansiedad y la depresión en niños y adolescentes vascoparlantes.

Anxiety and depression are currently the most common mental health problems worldwide (World Health Organization [WHO], 2022). Most mental disorders have their origin in childhood, adolescence or early adulthood (Fusar-Poli, 2019; Kessler et al., 2007), with around 50% of cases beginning before the age of 14 and 75% before the age of 24 (Kessler et al., 2005). Moreover, a study conducted in 31 European countries between 1990 and 2019 found that anxiety and depression were the most prevalent mental health conditions in the 10–24 year-old population and were the leading causes of years lived with disability (Castelpietra et al., 2022). In addition to this, the COVID-19 pandemic significantly increased anxiety and depression levels among child and youth populations (Amorós-Reche et al., 2022; Chai et al., 2021; Nearchou et al., 2020; Orgilés et al., 2021; Racine et al., 2021).

Estimates of the prevalence of emotional disorders among children and adolescents vary widely. For example, a meta-analysis by Polanczyk et al. (2015) found prevalence rates of 6.5% for anxiety and 2.6% for depression, whereas in a recent systematic review summarizing results for children and adolescents from nine countries, the prevalence of anxiety ranged from 17.6% to 43.7%, and that of depression from 6.3% to 71.5% (de Oliveira et al., 2022).

The prevalence of these disorders varies also by gender. According to the DSM-5-TR (American Psychiatric Association [APA], 2022), both anxiety and depression are twice as common among women as among men. Similarly, several studies have reported that girls have higher levels of anxiety and depression than boys (Basta et al., 2022; Castelpietra et al., 2022; Jiang et al., 2022; Kessler et al., 2012; Orgilés et al., 2012; van Droogenbroeck et al., 2018). In contrast, however, some studies argue that boys have higher levels of anxiety and depression (Costa et al., 2020; Patel & Jain, 2017), whereas others found no gender differences at all in either anxiety (Canals et al., 2019) or depression (Domènech-Llaberia et al., 2009; Pereira da Silva et al., 2022).

These inconsistencies are also present in studies examining age-related differences. For example, several studies report that anxiety and depression are more frequent (Costello et al., 2006; Jiang et al., 2022; Park et al., 2014) and more severe in adolescents than in children (Orgilés et al., 2012), and that both the prevalence (Merikangas et al., 2010; Tang et al., 2019) and severity of both disorders (Gaspar de Matos et al., 2003; Radwan et al., 2021) are higher in older adolescents than in younger ones. However, other studies report higher anxiety levels in younger adolescents (Gaeta & Martínez-Otero, 2014; Pampamallco & Matalinares, 2022) and some do not find any differences in anxiety between older and younger teenagers (Delvecchio et al., 2015).

Although depression and anxiety are two different disorders, their symptoms often appear simultaneously (Jacobson & Newman, 2017; Konac et al., 2021; Romero et al., 2010). It is estimated that 15–70% of children and adolescents with a diagnosis of depression simultaneously suffer from a comorbid anxiety disorder, and 10–15% of those with a diagnosis of anxiety simultaneously manifest a comorbid depressive disorder (Cummings et al., 2014).

Emotional disorders have a major impact on children and adolescents' psychosocial adjustment. Anxiety and depression are associated with severe impairment in academic and social

functioning (de Lijster et al., 2018; Tan et al., 2020; Verboom et al., 2014), as well as with behavioral problems (Blain-Arcaro & Vaillancourt, 2019; Chung et al., 2019; Drugé & Potvin, 2022; Pozuelo et al., 2022), substance abuse (Cioffredi et al., 2021; Essau et al., 2014; Klein et al., 2022; O'Neil et al., 2011) and suicidal behavior (Chen et al., 2021; Detullio et al., 2022; Kanwar et al., 2013; Windarwati et al., 2022). Indeed, depression and anxiety are, respectively, the third and fifth leading causes of loss of life years and increased disability in adolescents aged 10–19 years (Pan American Health Organization, 2018).

The findings outlined above highlight the need to detect such disorders at an early age, for which appropriate assessment instruments are required. Numerous instruments have been developed for measuring anxiety and depression in children and adolescents (see reviews by Bernaras et al., 2019; Spence, 2018). However, due to the comorbid nature of these conditions, it is very useful to have instruments that measure the symptoms of anxiety and depression simultaneously. Although several instruments have been designed for this purpose, including, for example, the Depression, Anxiety and Stress Inventory (DASS-21; Lovibond & Lovibond, 1995), the Educational-Clinical Questionnaire: Anxiety and Depression (CECAD; Lozano et al., 2007, 2013) is one of the few that enable anxiety and depression to be assessed from age 7 onwards. This instrument was first developed in Spain, was later adapted to the Peruvian culture (Ruiz, 2014) and the Basque language (Gorostiaga et al., 2018), and has been used in several studies (de la Fuente-Solana et al., 2017; Membrive-Jiménez et al., 2022; Menéndez-Aller et al., 2020; Pizarro-Ruiz & Ordóñez-Cambor, 2021; Quero et al., 2021). However, it has yet to be determined whether the CECAD is invariant to gender and age. The results reported in the extant literature regarding age and gender differences in anxiety and depression are inconclusive. It is therefore important to continue exploring this issue in greater depth, using instruments that guarantee the correct comparison and interpretation of the differences that may be observed between boys and girls, or between children and adolescents of different ages. This is only possible if the assessment instrument presents factorial invariance. Indeed, van Beek et al. (2012) highlight the importance of examining the factorial invariance of the instruments used to assess symptoms of depression and other disorders, in order to determine whether the possible age and gender differences observed are real or may be due to measurement bias. Given this need, our first aim was to analyze the gender and age invariance of the Basque version of the CECAD, as well as to compare the latent means for anxiety and depression in terms of gender (boys and girls) and age (over and under 14 years of age). Age 14 was established as the cut-off because middle adolescence is deemed to begin at that age (WHO, 2006) and also because it is a cut-off age frequently used by different studies focusing on emotional and behavioral problems (Fusar-Poli, 2019; Gaspar de Matos et al., 2003; Radwan et al., 2021). Regarding the hypotheses, we expected girls and participants older than 14 years to have higher anxiety and depression levels. Prior to analyzing its factorial invariance, we sought to confirm the two-dimensional structure of the instrument in a large sample of Basque students. In this regard, it should be noted that, in the first published edition of the original instrument in Spanish, a unidimensional structure

was reported, although in a later phase, with a larger sample, the CECAD was found to have a two-dimensional structure. The same structure was obtained in the Basque adaptation of the instrument. In addition to examining the instrument's factorial invariance and dimensionality, further evidence of the validity of the Basque version of the CECAD was obtained by evaluating its psychometric properties from the perspective of both Classical Test Theory (CTT) and Item Response Theory (IRT).

Method

Participants

The sample comprised 2131 students aged between 7 and 24 years ($M = 13.2$; $SD = 3.52$; 54.2% female) from 23 educational institutions in the Basque Country. A convenience sampling method was used and care was taken to ensure sufficient representation of the different academic levels of the target population, along with an equal number of public and subsidized schools. Approximately half of the institutions contacted refused to participate. Of the participants, 35.7% were in primary education, 36.2% in compulsory secondary education, 22.5% in the Spanish Baccalaureate (equivalent to the final two years of high school) and 5.6% were at university. In terms of the nature of the institutions attended, 56% were public and 44% subsidized. Regarding parents' education level, 59.6% had higher education qualifications, 28.3% secondary level qualifications and 12.1% primary level qualifications. All participants completed the CECAD.

Within the sample, two subsamples completed additional questionnaires to obtain evidence of convergent validity. One subsample, comprising 924 primary and secondary school students aged 8 to 16 years ($M = 10.88$; $SD = 2.18$; 53.1% female), responded also to the Children's Depression Scale (CDS). The second subsample, comprising 195 Baccalaureate students aged 16 to 18 years ($M = 16.88$; $SD = 0.68$; 65.6% female), completed the Child and Adolescent Assessment System (SENA).

Finally, a subsample of 72 participants ($M_{age} = 14.93$; $SD_{age} = 4.59$; 69.4% female) completed the Basque version of the CECAD twice.

Instruments

Sociodemographic Questionnaire. This included variables such as gender, age, grade and parents' education level and was designed ad hoc for the study.

Educational-Clinical Questionnaire: *Anxiety and Depression* (CECAD; Lozano et al., 2007, 2013; Basque version; Gorostiaga et al., 2018). This instrument comprises 50 items assessing anxiety (20 items), depression (29 items) and four clinical aspects: worthlessness (8 items), irritability (6 items), thinking problems (7 items) and psychophysiological symptoms (16 items) in people aged 7 years or older. It should be noted that one of the 50 items does not assess anxiety or depression, but remains in the instrument because it assesses one of the clinical aspects. Also, not all items are part of a clinical aspect. Items are rated on a 5-point Likert-type scale (ranging from 1, "Never", to 5, "Always"). Both

the original and the Basque version of the instrument have been found to have adequate psychometric properties. Specifically, in the Basque adaptation, Cronbach's alpha indices ranged between .81 and .94 for the main scales in various age groups, and between .68 and .87 for the clinical aspects (Gorostiaga et al., 2018).

Children's Depression Scale (CDS; Lang & Tisher, 1978; Basque version; Balluerka et al., 2012). The CDS comprises 66 items assessing two dimensions: total depressive (48 items) and total positive (18 items), in children and adolescents aged between 8 and 16 years. Items are rated on a 5-point Likert-type scale ranging from ++, "Strongly agree", to --, "Strongly disagree". The Basque adaptation of this instrument has been found to have adequate psychometric properties in terms of internal consistency (Cronbach's alpha of .95, for the depressive dimension, and .79 for the positive one) and temporal stability (test-retest correlation of .73 and .59, respectively) (Balluerka et al., 2012). In the present study, only the total depressive dimension was used (Cronbach's alpha of .95).

Child and Adolescent Assessment System (SENA; Fernández-Pinto et al., 2015). The SENA assesses, from a multi-dimensional and multisource (child/adolescent, family and school) perspective, a broad spectrum of emotional, behavioral and contextual problems, as well as areas of vulnerability and psychological resources in children and adolescents aged 3 to 18 years. It includes between 13 and 23 dimensions and between 77 and 188 items, depending on the version, all with adequate psychometric properties. In the present study, the version intended for adolescents aged between 12 and 18 years was used. This version includes 23 subscales and 188 items rated on a 5-point Likert-type scale (from 1, "Never or almost never", to 5, "Always or almost always"). Only the anxiety and depression subscales were used in this study.

Procedure

After informing them of the study aims, signed informed consent forms were collected from participants aged 12 years and over and from the parents or legal guardians of underage participants.

The instruments were answered collectively and anonymously in a single session held at participants' respective educational institutions. Underage students who did not have parental consent were moved to another classroom to perform activities determined by the school. To standardize the administration of the instruments, the psychologists responsible used a written protocol outlining the instructions to be given and the administration conditions, adapted to different age ranges. The order of the questionnaires was as follows: sociodemographic questionnaire followed by the Basque version of the CECAD. In the subsamples assigned to complete an additional instrument in order to enable evidence of convergent validity, this was administered in last position.

The test-retest participants completed the Basque version of the CECAD a second time, one month after the first administration.

The study was approved by the University of the Basque Country UPV/EHU Ethics Committee for Research and Teaching with Human Subjects.

Data Analysis

Item Analysis

Descriptive statistics (means, standard deviations, skewness, kurtosis) and corrected homogeneity indices were calculated, and histograms with normal curve overlay were compiled. Additionally, Item Response Theory (IRT) was used to estimate discrimination (a -parameters) and difficulty parameters (thresholds, b -parameters). Items with a discrimination parameter (a) greater than 0.65 (Baker, 2001) and a good fit ($p > .01$) to the graded response model were considered adequate (Orlando & Thissen, 2000, 2003). A high a -parameter value implies a high capacity to differentiate between participants with different levels in the assessed trait, and b -parameter values provide information about the level of the assessed trait needed to move from one response option to the next.

CECAD Dimensionality

Dimensionality was evaluated using a confirmatory factor analysis with a weighted least squares means and variance adjusted (WLSMV) estimator, due to the ordinal and non-normal nature of the data (Ferrando et al., 2022). Given that the first version of the scale in Spanish was unidimensional, three models were tested: a unidimensional one, a two-dimensional one with anxiety and depression factors but without correlations between the residuals of the clinical aspect items, and this same model with correlations between these residuals. Model fit was evaluated using the χ^2/df ratio, the Tucker-Lewis index (TLI), the comparative fit index (CFI), the root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR), with values greater than .90 being deemed acceptable for the TLI and CFI and values lower than .08 being deemed acceptable for the RMSEA and SRMR (Hu & Bentler, 1999).

Gender and Age Invariance and Differences in Latent Means

Three models were tested using a WLSMV estimator with theta parameterization. Model 1 examined configural invariance (same number of factors and pattern of factor loadings in both groups). Model 2 tested for metric or weak invariance (equal unstandardized factor loadings for both groups). And Model 3 tested scalar or strong invariance (unstandardized factor loadings and equal thresholds for both groups). This last type of invariance is required when, as in our case, the aim is to compare latent constructs in both groups (Cheung & Rensvold, 2002). In addition to examining the fit of each of the models using the χ^2/df ratio and the TLI, CFI and RMSEA indices, we also used the differences between the values of the χ^2 and CFI indices as a model comparison criterion. Cheung & Rensvold (2002) established $\Delta \leq .01$ in the CFI as indicating no difference between model fits.

Next, we examined possible differences in the latent means for anxiety and depression in accordance with participants' gender and age. For this purpose, the latent mean of girls and

participants aged 7–14 years was set to 0. Statistical significance was determined based on the z statistic and effect size, using the procedure proposed by Hancock (2001).

Reliability

McDonald's ω (omega) index was calculated as a measure of internal consistency (Doval et al., 2023), along with each factor's Test Information Function (TIF), which evaluates the degree of precision or information provided by the test for each level of the construct. Temporal stability was measured by calculating Spearman's correlation coefficient between the scores obtained by participants during the two administrations of the instrument.

Convergent Validity

Spearman's correlation coefficient was calculated between the depression and anxiety scores of the CECAD and those of the corresponding dimensions of the CDS (total depressive) and SENA (depression and anxiety).

Analyses were performed using SPSS (v. 28), Mplus (v. 7.4), IRTPRO (v. 5.2) and the R package *lavaan* (Rosseel, 2012) (v 3.5.1). Missing values were dealt with using the *pairwise* (available case analysis) or *listwise* (complete case analysis) strategy, depending on the analyses performed. Specifically, *pairwise* was used in correlations and *listwise* in the CFA and IRT.

Results

Item Analysis

Mean scores for the items ranged from 1.18 (D02) to 2.86 (A17), with an average of 2.03, and standard deviations ranged from 0.56 (D02) to 1.23 (A17), with an average of 0.97. When the skewness and kurtosis indices and the histograms were taken into account, most of the items were found to have normality problems. All items had a corrected homogeneity index equal to or greater than .30, with an average of .48. Table 1 presents the descriptive statistics for each of the items. Histograms are presented in Supplementary Material 1 (<https://osf.io/chb46>).

In terms of parameter estimation based on the IRT graded response model, discrimination values ranged from 0.62 (A09) to 1.72 (A15) for anxiety and from 0.88 (D04) to 2.33 (D29) for depression. The discrimination index exceeded the threshold of 0.65 for all items, except for item A09, with an average of 1.28. The fit to the graded response model was inadequate ($p < .01$) in only 11 items, although the discrimination index for said items was adequate. As for the difficulty indices, most of the items had positive values in all or almost all of their b -parameters, which is consistent with a good capacity to assess the existence of symptoms. Moreover, an ascending order was followed in all cases. Table 2 presents the parameters for all items. The item characteristic curves (ICC) indicated that participants with higher levels of anxiety and depression had a higher probability of selecting the higher response categories. The ICCs are presented in Supplementary Material 2 (<https://osf.io/q4wgj>).

Table 1
Descriptive Statistics and Homogeneity Indices of the CECAD Items

Item	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	Homogeneity indices	ω if item deleted
A01	2.82	0.76	-0.32	0.83	.30	.76
A02	2.18	0.96	0.64	0.16	.43	.77
A03	2.09	1.06	0.92	0.37	.43	.76
A04	1.54	0.86	1.68	2.64	.45	.76
A05	2.22	0.94	0.41	-0.13	.38	.76
A06	2.30	1.19	0.73	-0.26	.43	.76
A07	1.59	0.83	1.40	1.68	.43	.76
A08	1.60	0.91	1.66	2.53	.39	.74
A09	1.97	0.98	0.79	0.11	.30	.76
A10	1.66	0.88	1.38	1.79	.41	.74
A11	2.05	0.95	0.68	0.17	.39	.76
A12	1.67	0.90	1.29	1.14	.45	.76
A13	2.20	1.04	0.58	-0.22	.54	.73
A14	1.82	0.94	0.98	0.39	.42	.75
A15	2.26	1.08	0.63	-0.18	.57	.73
A16	1.53	0.87	1.82	3.17	.50	.76
A17	2.86	1.23	0.24	-0.84	.39	.75
A18	1.68	0.92	1.44	1.82	.40	.74
A19	2.02	1.01	0.86	0.32	.49	.73
A20	1.76	0.92	1.11	0.76	.50	.74
D01	1.79	0.84	0.94	0.71	.43	.91
D02	1.18	0.56	3.70	15.22	.41	.91
D03	2.20	0.97	0.54	0.01	.48	.91
D04	2.31	1.11	0.60	-0.26	.38	.91
D05	2.57	1.04	0.34	-0.22	.45	.91
D06	2.35	1.13	0.53	-0.38	.45	.91
D07	2.04	1.19	0.99	0.12	.43	.91
D08	2.74	0.91	-0.01	0.40	.48	.91
D09	1.65	0.85	1.19	0.82	.60	.91
D10	2.04	0.91	0.68	0.25	.52	.91
D11	1.94	0.97	0.89	0.30	.66	.91
D12	2.29	1.14	0.58	-0.46	.60	.90
D13	2.03	0.84	0.65	0.44	.41	.91
D14	1.83	0.93	0.95	0.47	.50	.91
D15	1.41	0.81	2.23	4.91	.58	.91
D16	2.26	1.07	0.55	-0.30	.63	.91
D17	2.07	1.00	0.82	0.29	.61	.91
D18	2.54	1.07	0.40	-0.28	.41	.91
D19	2.57	1.03	0.33	-0.22	.53	.91
D20	2.29	1.18	0.74	-0.22	.56	.91
D21	2.18	1.05	0.62	-0.14	.58	.91
D22	2.14	0.99	0.70	0.21	.43	.91
D23	2.58	0.97	0.13	-0.23	.53	.91
D24	1.92	0.98	0.75	-0.13	.40	.91
D25	1.57	0.88	1.57	2.07	.58	.90
D26	2.03	1.05	0.83	0.06	.61	.90
D27	2.09	0.91	0.41	-0.33	.62	.90
D28	1.50	0.83	1.81	3.10	.61	.90
D29	1.49	0.87	1.93	3.36	.63	.90

Table 2
 Parameter Estimations using the Graded Response Model for the CECAD Items

Item	<i>a</i>	<i>SE</i>	<i>b1</i>	<i>SE</i>	<i>b2</i>	<i>SE</i>	<i>b3</i>	<i>SE</i>	<i>b4</i>	<i>SE</i>	χ^2	<i>df</i>	Prob.
A01	0.75	0.05	-4.00	0.28	-1.56	0.12	2.78	0.19	6.07	0.46	130.22	131	.503
A02	0.96	0.05	-1.31	0.08	0.83	0.06	2.86	0.16	4.40	0.26	174.99	144	.040
A03	0.94	0.05	-0.84	0.07	1.11	0.07	2.65	0.15	3.88	0.22	175.14	151	.087
A04	1.32	0.07	0.59	0.04	1.73	0.08	3.18	0.16	3.96	0.22	117.80	113	.359
A05	0.83	0.05	-1.47	0.10	0.59	0.06	3.57	0.22	5.20	0.34	154.23	143	.246
A06	0.96	0.05	-1.04	0.07	0.59	0.06	2.09	0.11	3.03	0.16	156.12	153	.414
A07	1.22	0.07	0.39	0.04	1.74	0.09	3.44	0.18	4.50	0.28	119.39	115	.370
A08	1.04	0.06	0.55	0.05	1.94	0.11	3.44	0.20	4.35	0.27	135.61	136	.494
A09	0.62	0.05	-0.73	0.09	1.51	0.13	4.69	0.36	6.64	0.54	171.32	145	.067
A10	1.09	0.06	0.20	0.05	1.81	0.10	3.51	0.19	4.50	0.27	127.05	124	.407
A11	0.93	0.05	-0.85	0.07	0.97	0.07	3.51	0.20	4.62	0.28	184.90	139	.006
A12	1.18	0.06	0.28	0.04	1.53	0.08	3.18	0.16	4.43	0.27	126.85	123	.387
A13	1.57	0.07	-0.72	0.05	0.44	0.04	1.93	0.08	2.89	0.12	131.88	131	.462
A14	1.07	0.06	-0.10	0.05	1.32	0.08	3.24	0.17	4.61	0.28	156.12	129	.052
A15	1.71	0.08	-0.80	0.05	0.39	0.04	1.65	0.06	2.49	0.10	168.11	131	.016
A16	1.54	0.08	0.61	0.04	1.65	0.07	2.77	0.13	3.46	0.18	124.18	117	.307
A17	0.87	0.05	-2.35	0.14	-0.45	0.06	1.24	0.08	2.41	0.14	138.22	156	.844
A18	1.01	0.06	0.26	0.05	1.82	0.10	3.44	0.19	4.43	0.27	165.53	136	.043
A19	1.21	0.06	-0.57	0.05	0.89	0.05	2.55	0.12	3.49	0.17	141.44	139	.426
A20	1.42	0.07	0.02	0.04	1.26	0.06	2.74	0.12	3.77	0.19	110.97	118	.664
D01	1.01	0.05	-0.31	0.05	1.70	0.09	4.04	0.22	5.33	0.35	178.41	157	.116
D02	1.42	0.09	1.84	0.09	2.69	0.14	3.78	0.22	4.66	0.33	124.96	112	.189
D03	1.09	0.05	-1.11	0.07	0.57	0.05	2.74	0.13	3.93	0.20	219.82	194	.098
D04	0.88	0.05	-1.28	0.09	0.54	0.06	2.39	0.13	3.79	0.21	276.05	224	.010
D05	1.02	0.05	-1.89	0.10	-0.15	0.05	1.98	0.10	3.25	0.16	290.93	221	.001
D06	1.00	0.05	-1.15	0.08	0.29	0.05	2.12	0.11	3.31	0.17	260.52	224	.047
D07	0.99	0.05	-0.25	0.05	0.96	0.06	2.42	0.13	3.18	0.17	274.67	223	.010
D08	1.16	0.06	-2.18	0.11	-0.83	0.06	2.00	0.09	3.23	0.15	262.76	200	.002
D09	1.80	0.08	0.19	0.03	1.28	0.05	2.71	0.11	3.89	0.21	201.99	141	.001
D10	1.21	0.06	-0.85	0.06	0.95	0.05	2.86	0.13	4.11	0.22	170.49	181	.701
D11	1.98	0.08	-0.31	0.04	0.81	0.04	2.05	0.07	2.97	0.12	162.00	159	.418
D12	1.53	0.06	-0.74	0.05	0.36	0.04	1.56	0.06	2.62	0.11	227.14	196	.063
D13	0.95	0.05	-1.18	0.08	1.28	0.08	3.66	0.20	5.34	0.34	224.91	180	.013
D14	1.19	0.06	-0.18	0.05	1.20	0.06	3.14	0.15	4.17	0.23	249.71	173	.001
D15	2.17	0.10	0.80	0.04	1.57	0.05	2.47	0.09	3.13	0.14	200.66	132	.001
D16	1.60	0.07	-0.81	0.05	0.36	0.04	1.72	0.06	2.78	0.11	226.11	190	.037
D17	1.64	0.07	-0.58	0.04	0.76	0.04	2.04	0.08	2.93	0.12	230.20	175	.003
D18	0.89	0.05	-1.98	0.12	-0.03	0.05	2.13	0.12	3.54	0.20	261.71	230	.074
D19	1.31	0.06	-1.63	0.08	-0.11	0.04	1.66	0.07	2.79	0.12	226.83	207	.164
D20	1.34	0.06	-0.81	0.05	0.46	0.04	1.70	0.07	2.39	0.10	219.95	214	.375
D21	1.48	0.06	-0.70	0.05	0.47	0.04	2.07	0.08	2.95	0.12	198.32	186	.255
D22	1.00	0.05	-1.03	0.07	0.81	0.06	2.91	0.15	4.02	0.22	231.10	199	.059
D23	1.33	0.06	-1.66	0.08	-0.23	0.04	1.76	0.07	3.18	0.14	275.05	189	.001
D24	0.96	0.05	-0.29	0.05	1.01	0.07	3.50	0.19	4.84	0.29	228.00	186	.019
D25	1.82	0.08	0.45	0.03	1.34	0.05	2.55	0.10	3.34	0.15	163.10	145	.144
D26	1.66	0.07	-0.40	0.04	0.69	0.04	1.97	0.07	2.87	0.12	245.53	181	.001
D27	1.76	0.07	-0.69	0.04	0.54	0.04	2.46	0.09	3.54	0.17	191.02	151	.015
D28	2.10	0.10	0.55	0.03	1.47	0.05	2.44	0.09	3.25	0.15	158.25	134	.075
D29	2.33	0.11	0.62	0.03	1.35	0.05	2.22	0.08	2.95	0.12	198.21	133	.001

Note. *a* = discrimination parameter; *b1*, *b2*, *b3*, *b4* = difficulty parameters.

CECAD Dimensionality

Table 3 shows the fit indices of the three models tested. The fit of the first two models was not good. However, the fit of the third model was acceptable. Moreover, all items, except items A03, A05, A06 and A09, which had values of between .28 and .38, had factor loadings ranging from .42 to .79 on their corresponding factors.

Gender and Age Invariance and Latent Mean Differences

The results of the multigroup CFA are presented in Table 4. The χ^2/df , CFI, TLI and RMSEA values suggest an adequate fit of the three models by gender and age. Given that the differences between the most and least restricted models in terms of the CFI values, for both gender and age invariance, were below the cut-off point recommended by Cheung & Rensvold (2002), we can conclude that the CECAD has strict factorial invariance for the scores of both boys and girls and children aged 7–14 and over 14 years.

Table 5 shows the estimated latent trait means for the male and female groups and for participants aged 7–14 and over 14 years. Regarding gender, statistically significant differences were observed between the two groups, with girls having higher mean scores in both anxiety and depression. However, the magnitude of the difference between these means was small for anxiety ($d = 0.22$) and small-to-moderate for depression ($d = 0.38$). Regarding age, statistically significant differences were observed only in

depression, with the over 14 group scoring higher. The effect size was moderate ($d = 0.48$).

Reliability

The internal consistency of the two dimensions of the CECAD was adequate, with McDonald’s ω values of .76 (95% CI between .73 and .78) and .91 (95% CI between .73 and .78) for anxiety and depression, respectively.

From the perspective of IRT, the highest accuracy is obtained when assessing a person whose level on the latent trait (θ) ranges between 0.5 and 3 (See Supplementary Material 3, <https://osf.io/gqwab> for the information functions of both dimensions).

In terms of temporal stability, Spearman’s correlation coefficient values with a one month interval were .64 (95% CI between .46 and .77; $p < .001$) and .61 (95% CI between .42 and .75; $p < .001$) for anxiety and depression, respectively.

Convergent Validity

The depression dimension of the CECAD correlated with the total depressive dimension of the CDS and the depression dimension of the SENA, with values of .70 (95% CI between .66 and .74; $p < .001$) and .76 (95% CI between .69 and .81; $p < .001$), respectively. In turn, the anxiety dimension of the CECAD was found to have a correlation of .62 (95% CI between .52 and .70; $p < .001$) with this same dimension of the SENA.

Table 3
Fit Indices of the CECAD Confirmatory Factor Analysis Models

Model	χ^2 (df)	χ^2/df	CFI	TLI	RMSEA [90% CI]	SRMR [90% CI]
Model 1: Unidimensional	11042.64 (1127)	9.80	.843	.837	.064 [.063 – .065]	.058 [.056 – .060]
Model 2: Two-dimensional (no correlations between the residuals of the clinical aspects)	9680.24 (1126)	8.60	.865	.859	.060 [.059 – .061]	.054 [.052 – .056]
Model 3: Two-dimensional (correlations between the residuals of the clinical aspects)	4666.56 (957)	4.88	.941	.928	.043 [.041 – .044]	.037 [.035 – .039]

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; CI = confidence interval.

Table 4
Fit Indices of the CECAD Gender and Age Invariance Models

Invariance model	χ^2 (df)	χ^2/df	$\Delta\chi^2$ (df)	CFI	Δ CFI	TLI	RMSEA [90% CI]
Gender invariance							
Model 1: Configural invariance	5216.53* (1914)	2.725		.948		.936	.040 [.039 – .042]
Model 2: Metric invariance	5269.96* (1961)	2.687	104.26* (47)	.948	0	.937	.040 [.039 – .041]
Model 3: Scalar invariance	5084.83* (2106)	2.414	263.06* (145)	.953	.005	.947	.036 [.035 – .038]
Age invariance							
Model 1: Configural invariance	5294.82* (1914)	2.766		.946		.934	.041 [.039 – .042]
Model 2: Metric invariance	5643.91* (1961)	2.878	352.34* (47)	.942	-.004	.930	.042 [.041 – .043]
Model 3: Scalar invariance	5726.04* (2106)	2.719	447.44* (145)	.943	.001	.936	.040 [.039 – .041]

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; CI = confidence interval.

* $p < .001$

Table 5
Results of the Comparison of Latent Means in accordance with Gender and Age

Groups	Anxiety		Depression	
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Gender				
Female (fixed)	0.00		0.00	
Male	-0.11	0.03	-0.26	0.04
Age				
Group 1 (7–14) (fixed)	0.00		0.00	
Group 2 (> 14)	0.03	0.02	0.28	0.03

Discussion

The main aim of the present study was to examine dimensionality and gender and age invariance, and to obtain evidence of the validity of the CECAD in the Basque population. Descriptive statistics and homogeneity, discrimination and difficulty indices revealed that most of the items have adequate psychometric properties.

Regarding factor structure, the CFA results revealed that the Basque version of the CECAD comprises two dimensions: anxiety and depression, a structure that is consistent with that proposed by the authors of the original scale in its most recent edition (Lozano et al., 2013), as well as with that observed in the Peruvian sample (Ruiz, 2014) and in the Basque adaptation (Gorostiaga et al., 2018). Similarly, the multigroup CFAs by gender and age returned good fit indices for all models and the two dimensions of the CECAD were found to be gender and age invariant. To the best of our knowledge, this is the first study to analyze the invariance of the factor structure of the CECAD in accordance with these sociodemographic variables, demonstrating that the meaning of the items remains constant for boys and girls, as well as for children and adolescents.

Latent means were higher for girls than for boys in anxiety and depression, confirming our initial hypothesis, but with small-to-moderate effect sizes. These results are consistent with those reported by other authors who observed higher levels of both types of symptoms in females (Basta et al., 2022; Castelpietra et al., 2022; Jiang et al., 2022; Kessler et al., 2012; Orgilés et al., 2012; van Droogenbroeck et al., 2018). However, the small size of the differences may also be consistent with the absence of differences observed by Canals et al. (2019) and Domènech-Llaberia et al. (2009).

For their part, participants aged 14 years and over had higher latent means in depression than their younger counterparts. In this case, the effect size was also small-to-moderate. As for anxiety, no statistically significant differences were observed in accordance with age. These results partially confirm our hypothesis. Gaspar de Matos et al. (2003) and Radwan et al. (2021) also observed higher levels of depression among older adolescents. However, similarly to that reported by Radwan et al. (2021), in our study, these differences did not have a large effect size. The results obtained for anxiety are consistent with those reported by Delvecchio et al. (2015), who observed no differences in anxiety in accordance with age.

Regarding reliability, the internal consistency indices (based on both CTT and IRT) and temporal stability values were good.

Likewise, the information functions of both dimensions indicate that the highest accuracy is obtained at medium and high levels of the assessed construct, suggesting that the Basque version of the CECAD is a suitable instrument for accurately identifying people suffering from medium and high levels of anxiety and depression. This is appropriate for the purpose of the test, which is to detect cases that may require preventive or therapeutic intervention.

Finally, regarding convergent validity, the correlations between the CECAD dimensions and the corresponding dimensions of the CDS and SENA can be considered excellent.

In sum, the study provides further evidence of the validity of the CECAD in a large sample of Basque students. From a theoretical perspective, it provides support for the two-dimensional structure of the scale and demonstrates the gender and age invariance of both dimensions: anxiety and depression. Furthermore, it provides data supporting the hypothesis that differences between boys and girls and between those aged under and over 14 years (the age at which middle adolescence is deemed to begin) are small. From a practical point of view, the study provides new evidence of the reliability and validity of one of the few instruments in Basque that enable an assessment of anxiety and depression from age 7 onwards. Given both the scarcity of instruments in this language and the importance of being able to assess people in their first language, we believe this to be a relevant contribution to clinical and educational practice, as well as to basic research. We can therefore conclude that the Basque version of the CECAD is useful not only for furthering our understanding of mental health problems, but also for the early detection of anxiety and depression in the Basque population. In this sense, it should be noted that early detection is essential for enabling effective treatments aimed at reducing possible adverse health consequences and improving young people's quality of life (for a review of empirically-supported psychological treatments, see Fonseca-Pedrero et al., 2021). This is also applicable to the educational setting, in which the CECAD may be very useful for both detecting needs that arise in the classroom and identifying individuals who are at risk for anxiety, depression or other mental health problems.

The main limitations of the study were its cross-sectional nature and the use of self-report measures. However, as Southam-Gerow & Chorpita (2007) point out, this has been the most widely-used method in research and clinical practice to evaluate both conditions, although the use of interviews or observation methods would have strengthened the evidence attesting to the CECAD's convergent validity.

The CECAD enables the simultaneous assessment of symptoms of anxiety and depression and has been adapted to other languages and cultures (Gorostiaga et al., 2018; Ruiz, 2014) and used in several studies. It is also widely used in clinical settings. For all these reasons, it is important to strengthen existing evidence of its validity with large samples of participants, verify that its internal structure includes both anxiety and depression dimensions, and demonstrate that both dimensions are gender and age invariant. Factorial invariance guarantees that the comparison and interpretation of gender and age differences are correct, which is essential for future studies seeking to clarify the relationship of gender and age with anxiety and depression. The results obtained in the present study contribute to this aim.

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