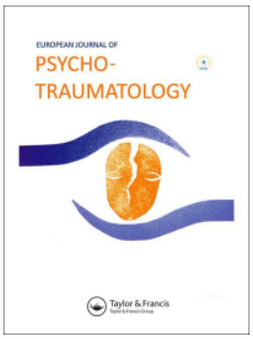

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CLINICAL RESEARCH ARTICLE

The 10-item Adverse Childhood Experience International Questionnaire (ACE-IQ-10): psychometric properties of the Dutch version in two clinical samples

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ABSTRACT

Background: Childhood trauma has been associated with adult mental disorders, physical illness, and early death. The World Health Organization (WHO) supported the development of the Adverse Childhood Experiences International Questionnaire (ACE-IQ) to explore childhood trauma in adults. We report the psychometric properties of the Dutch version of the Adverse Childhood Experiences International Questionnaire 10 items version (ACE-IQ-10) in the Netherlands.

Methods: Confirmatory factor analysis was performed in two convenience samples of consecutive patients presenting at an outpatient specialty mental health setting between May 2015 and September 2018: Sample A ($N = 298$), patients with anxiety and depressive disorders; and sample B ($N = 234$), patients with Somatic Symptom and Related Disorders (SSRD). Criterion validity of the scales of the ACE-IQ-10 was explored by their correlation with the PHQ-9, the GAD-7, and the SF-36. The correlation between reporting sexual abuse on the ACE-IQ-10 and in a face-to-face interview was assessed as well.

Results: We found support for a two-factor structure in both samples: one for directly experiencing childhood abuse and another for household dysfunction, but also support for using the total score. The correlation between reporting a sexual trauma in childhood at face-to-face interview and the sexual abuse item of the ACE-IQ-10 was $r = .98$ ($p < .001$).

Conclusions: The current study provides evidence on the factor structure, reliability, and validity of the Dutch ACE-IQ-10 in two Dutch clinical samples. It shows clear potential of the ACE-IQ-10 for further research and clinical use. Further studies are needed to assess the ACE-IQ-10 in the Dutch general population.

El Cuestionario Internacional de Experiencias Adversas en la Infancia de 10 ítems (ACE-IQ-10): propiedades psicométricas de la versión holandesa en dos muestras clínicas

Antecedentes: El trauma infantil se ha asociado con trastornos mentales en adultos, enfermedades físicas y muerte prematura. La Organización Mundial de la Salud (OMS) apoyó el desarrollo del Cuestionario Internacional de Experiencias Adversas en la Infancia (ACE-IQ) para explorar el trauma infantil en adultos. Presentamos las propiedades psicométricas de la versión holandesa de la versión de 10 ítems del Cuestionario Internacional de Experiencias Adversas en la Infancia (ACE-IQ-10) en los Países Bajos.

Método: Se realizó un análisis factorial confirmatorio en dos muestras de conveniencia de pacientes consecutivos que acudieron a un centro ambulatorio especializado en salud mental entre mayo de 2015 y septiembre de 2018: Muestra A ($N = 298$), pacientes con trastornos de ansiedad y depresión; y muestra B ($N = 234$), pacientes con Síntomas Somáticos y Trastornos Relacionados (SSRD en su sigla en inglés). La validez de criterio de las escalas del ACE-IQ-10 se exploró mediante su correlación con el PHQ-9, el GAD-7 y el SF-36. También se evaluó la correlación entre denunciar abuso sexual en el ACE-IQ-10 y en una entrevista cara a cara.

Resultados: Encontramos respaldo para una estructura de dos factores en ambas muestras: uno para experimentar directamente el abuso infantil y otro para la disfunción del hogar, pero también respaldo para usar el puntaje total. La correlación entre reportar un trauma sexual en la niñez en entrevista cara a cara y el ítem de abuso sexual del ACE-IQ-10 fue $r = .98$ ($p < .001$).

Conclusiones: El estudio actual proporciona evidencia sobre la estructura factorial, la confiabilidad y la validez del ACE-IQ-10 en holandés en dos muestras clínicas holandesas. Éste muestra un claro potencial del ACE-IQ-10 para futuras investigaciones y uso clínico. Se necesitan más estudios para evaluar el ACE-IQ-10 en la población general holandesa.

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Adverse childhood experiences; ACE-IQ-10; validation; psychometrics; childhood sexual abuse; household dysfunction

PALABRAS CLAVE
Experiencias adversas infantiles; ACE-IQ-10; validación, psicometría; abuso sexual infantil; disfunción del hogar

关键词
童年不良经历; ACE-IQ-10; 验证; 心理测量学; 童年期性虐待; 家庭功能障碍

HIGHLIGHTS

- This is the first study reporting the psychometric properties of the Dutch version of the short version of the Adverse Childhood Experiences International Questionnaire (ACE-IQ-10).
- We found support for a two-factor structure: one for directly experiencing childhood abuse and another for household dysfunction, but also support for using the total score. The sexual abuse item of the ACE-IQ-10 correlates highly with face-to-face exploration (r = .98).
- The ACE-IQ-10 shows clear potential for clinical use, for example as a first screener to support further exploration of adverse childhood experiences.

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10 条目童年不良经历国际问卷 (ACE-IQ-10)：两个临床样本中荷兰语版本的心理测量特性

背景: 童年期创伤与成年精神障碍、躯体疾病和早逝有关。世界卫生组织 (WHO) 支持开发童年不良经历国际问卷 (ACE-IQ)，以探索成年人的童年期创伤。我们报告了荷兰语版10 条目童年不良经历国际问卷(ACE-IQ-10) 的心理测量特性。
方法: 对 2015 年 5 月 15 日至 2018 年 9 月期间连续在门诊专科心理健康机构就诊患者的两个方便样本进行验证性因素分析：焦虑和抑郁患者的样本 A（$N = 298$）； 和患有躯体症状和相关疾病 (SSRD) 患者的样本 B ($N = 234$)。 ACE-IQ-10 量表的标准有效性通过它们与 PHQ-9、GAD-7 和 SF-36 的相关性进行了探索。还评估了在 ACE-IQ-10 上报告性虐待与在面对面访谈中报告性虐待之间的相关性。
结果: 我们发现两个样本都支持双因素结构：一个是直接经历童年期虐待，另一个是家庭功能障碍，但也支持使用总分。在面对面访谈中报告儿童时期的性创伤与 ACE-IQ-10 的性虐待条目之间的相关性为 $r = .98$ ($p < .001$)。
结论: 当前的研究提供了两个荷兰临床样本中荷兰 ACE-IQ-10 的因素结构、可靠性和有效性的证据。它表明了 ACE-IQ-10 对进一步研究和临床应用的明显潜力。需要进一步研究来评估荷兰一般人群中的 ACE-IQ-10。

1. Background

Childhood trauma has been associated with adult mental disorders, physical illness, and early death (Felitti et al., 1998; Powers et al., 2019; Shahab et al., 2021; Van der Feltz-Cornelis et al., 2019). Various psychological, social and physiological mechanisms have been suggested for this association (Merrick et al., 2017; Moffitt et al., 2006; Schreier et al., 2020). The original Adverse Childhood Experiences (ACE) study was executed from 1995–1997 in 17,000 Health Maintenance Organizations. It explored ten adverse childhood experiences which were assumed to be the most prominent and influential as laid down by Felitti et al. (1998). The Adverse Childhood Experience Questionnaire (ACE-Q) for that study (Centers for Disease Control and Prevention, 1997) which was a brief checklist questionnaire. They found that persons who had experienced four or more categories of childhood exposure, had 4-to 12-fold increased health risks for alcoholism, drug abuse, depression, and suicide attempts, compared to people who had experienced none (Felitti et al., 1998).

Given these findings and the clear public health relevance, the World Health Organization (2018[2021]) subsequently supported the further development of the questionnaire so that it could be used in different countries and settings to respond to calls to explore childhood trauma systematically and feasibly (Westermair et al., 2018) by field testing to explore more facets of ACE, including war experiences and ghetto-related experiences. This resulted in the 31-item Adverse Childhood Experiences International Questionnaire (ACE-IQ), designed to be completed by people aged 18 years and older (Gette et al., 2022). Questions cover family dysfunction; physical, sexual and emotional abuse and neglect by parents or caregivers; peer violence; witnessing community violence, and exposure to collective violence and war (World Health Organisation, 2018[2021]).

In 2015 a short version with ten items was developed from the 31 item ACE-IQ. This ACE-IQ-10 aligned closely with the original ACE-Q wording, but changed the wording of four of the 10 original items slightly to make it more suitable for a self-report questionnaire. More specifically, in item 1 and 2 the requirement to have experienced the event often was omitted; just experiencing the event once sufficed for an affirmative answer in the ACE-IQ-10. In item 3, exploring sexual abuse, in the ACE-IQ-10 'when you did not want them to?' was added to the description of possible sexual behaviours towards the respondent. Finally, in item 8 on addiction in the household, ACE-IQ-10 added prescription drugs as a possible substance. This ACE-IQ-10 was used for this validation study. It has the advantage that it assesses ACE swiftly, does not require a lot of time and effort of the respondent, and can, for example, be used for early screening of ACE in a battery of assessment instruments prior to commencing treatment (Van der Feltz-Cornelis et al., 2019). Items with affirmative answers can be further explored in a clinical interview. The relevance of ACE as a possible underlying factor in mental disorders potentially interfering with treatment has been acknowledged widely (De Venter et al., 2013; Oral et al., 2016; Van der Feltz-Cornelis et al., 2019). Validating a short version accommodates the wish for a shorter questionnaire compared to the 31 item one that could be used in the clinical setting as a screener, and can be used as self-report in a format that would be user friendly.

The ACE-IQ-10 questionnaire assesses two distinct sets of adverse childhood experiences: events that directly affected the respondent, such as physical, emotional, or sexual abuse and physical or emotional neglect (the first five items), and events that happened to other family members and may have indirectly affected the respondent, such as parental divorce, domestic violence towards the (step)mother, parental mental health problems, substance use, or

imprisonment of a family member (the second set of five items). These two sets of items were named 'childhood abuse' and 'household dysfunction', and they were discerned given the potentially differential impact of childhood abuse versus household dysfunction on psychopathology and functioning. Previous research has indeed found support for a two-factor model of the ACE-IQ (Afifi et al., 2020; Anda & Felitti, 1998; Felitti et al., 1998; Gette et al., 2022; Nishimi et al., 2020; Zarse et al., 2019), with a differential effect for household dysfunction and childhood abuse regarding ramifications for treatment (Negriff, 2020). This has been done mostly in general population samples and there is a need to explore this in clinical samples. Also, it is unknown whether the ACE-IQ-10 factor structure is similar in disorders with a focus on distressing somatic symptoms, such as Somatic Symptom Disorders and Related Disorders (SSRD). Although several studies explore the link between ACE and somatic symptoms in adulthood (Kuhar & Zager Kocjan, 2022), and pathological mechanisms at play in that link (Lin et al., 2020), thus far the ACE-IQ-10 has not been used or validated in SSRD.

Regarding childhood sexual abuse, the question rises whether a self-report questionnaire such as the ACE-IQ-10 is a valid method to detect childhood sexual abuse in the clinical setting, or that questioning the patient in a face-to-face interview would be a better option. On the one hand, one might argue that face-to-face personal contact with the interviewer might be experienced as supportive and increase the readiness for such a disclosure. However, childhood sexual abuse might be an embarrassing subject to discuss or reveal in a face-to-face interview (Bethell et al., 2017). However, in the clinical setting discussing sexual abuse tends to be liable to under-reporting. To address that, exploration might be done more systematically and reliably in a self-report form, such as the ACE-IQ-10. Finally, although validation studies of the ACE-IQ were reported in a variety of countries in adults and adolescents (Ho et al., 2019; Kidman et al., 2019) the effect of age and gender on ACE reporting has not yet been explored. Age or gender differences are highly relevant for a proper interpretation of test results: for instance, if women report more adverse childhood experiences than men, a high score on the ACE of a man is more extraordinary than the same score for a woman. Similarly there might be differences according to age.

To date, there are no validation studies for the short version of the ACE-IQ, the ACE-IQ-10; and thus far the Dutch version of the ACE-IQ-10 has not been validated in the Netherlands, whereas there is much to say for using a short version that focuses on the most common adverse childhood experiences, and is more feasible for routine clinical use than the longer version. Therefore, this study aims to validate the Dutch version of the ACE-IQ-10 for clinical and research purposes.

1.1. Objectives

Explore (1) whether the ACE-IQ-10 comprises of two sets of interrelated items as tested by confirmatory factor analyses; (2) whether this factor model fits in various patient samples; (3) whether the two factors are differentially associated with other constructs, such as current levels of psychopathology; (4) whether there are age or gender differences in ACE scores; (5) how reporting of sexual abuse compares between self-report on the ACE-IQ-10 and in a face-to-face interview.

2. Methods

2.1. Design

In a cross-sectional study, given the support for a two-factor model of the ACE-IQ in previous research (Anda & Felitti, 1998; Felitti et al., 1998; Gette et al., 2022; Nishimi et al., 2020) and given that these two types of childhood experiences may have a differential impact on psychopathology and functioning in later life, we performed Confirmatory Factor Analysis (CFA) on data of the Dutch version of the ACE-IQ-10. Furthermore, we investigated the invariance of the factor structure in two samples with two distinct patient groups: patients with common mental disorders, such as depressive and anxiety disorders, and patients with distressing somatic symptoms, such as Somatic Symptom Disorders and Related Disorders (SSRD). In the SSRD sample, two distinct methods were used to obtain information about adverse childhood sexual experiences; the ACE questionnaire and other questionnaires were sent digitally via Routine Outcome Monitoring (ROM) assessment with questions in fixed order to fill as self-report measure at home, several weeks before the actual intake; and the answers were not used to direct the face-to-face interviewer during intake. The intake was done via a semi-structured format that included an item to ask for sexual abuse. All answers were then taken together to discuss in a Multi-Disciplinary Team meeting to finalize DSM classification, diagnosis and treatment plan. We compared the response to the ACE-IQ-10 self-report item regarding childhood sexual abuse with the response to the same question in a face-to-face diagnostic semi-structured interview performed by trained psychologists during the intake in this sample.

2.2. Samples

We used data from two convenience samples: one of 298 consecutive patients presenting at an outpatient specialty mental health setting for treatment of anxiety and depressive disorders at GGz Breburg, in the Netherlands, between May 2015 and November 2016 (ANXDEP sample). They were screened at intake

with the ACE-IQ-10 and a battery of other self-report measures. 112 (37.6%) suffered from clinical depression; 78 (26.2%) from anxiety disorder; 41 (13.8%) had Post Traumatic Stress Disorder (PTSD) according to DSM-IV-TR criteria as established in the intake (American Psychiatric Association, 2000).

A second sample consisted of 234 consecutive patients presenting at an outpatient specialty mental health setting for SSRD at the Clinical Centre of Excellence for Body Mind and Health (CLGG), GGz Breburg, the Netherlands, between September 2016 and September 2018 (SSRD sample). All of them were screened at intake for treatment of SSRD with the ACE-IQ-10 and other self-report measures; they also had a face-to-face intake semi-structured interview exploring childhood, including sexual trauma. In terms of clinical diagnosis, all suffered from SSRD; 271 (81%) had Somatic Symptom Disorder (SSD), 53 (16%) had PTSD, 38 (11%) had conversion disorder. All patients had to be 18 years or older.

2.3. Measures

2.3.1. ACE-IQ-10

The long version of the ACE_IQ instrument has been well validated among adult samples in the USA (Ford et al., 2014; Murphy et al., 2014), however, validation studies of the ACE-IQ-10 are lacking so far and the psychometric properties of the Dutch version were not yet investigated. For the Netherlands, this short 2015 ACE-IQ-10 version was translated from English to Dutch and back-translated. Moreover, a trauma expert was consulted about the acceptability of the phrasing of the questions. Next, the ACE-IQ-10 was introduced in the clinical setting as a self-report questionnaire with items scoring YES or NO and calculating a total score (range 0–10), where it proved to be feasible for clinical use and for research (Van der Feltz-Cornelis et al., 2019; Van der Feltz-Cornelis, Allen, et al., 2020; Van der Feltz-Cornelis, Bakker, et al., 2020) The items in English are shown in the Supplementary file. The Dutch version can be obtained from the first author.

2.3.2. PHQ-9

Depression was assessed using the Patient Health Questionnaire (PHQ-9). The PHQ-9 is a reliable 9-item self-report questionnaire that measures symptoms of depression during the last two weeks, with higher scores indicating higher levels of depressive symptoms (Kroenke et al., 2001). Item scores ranged from 0 (not at all) to 3 (nearly every day), and total scores ranged from 0 to 27. Cut-off points of 5, 10, 15, and 20 represent mild, moderate, moderately severe and severe levels of depression (Kroenke et al., 2010). Overall, the PHQ-9 items show good internal consistency (Cronbach's alpha = 0.85) (Gilbody et al., 2007; Kroenke et al., 2001).

2.3.3. GAD-7

Anxiety was assessed using the Generalized Anxiety Disorder (GAD-7). The GAD-7 is a reliable 7-item self-report questionnaire that measures symptoms of anxiety during the last two weeks. Higher scores indicated a higher symptom burden. GAD-7 scores range from 0 to 21, and cut-off scores of 5, 10, and 15 represent mild, moderate, and severe anxiety levels (Kroenke et al., 2010). Internal consistency was excellent, Cronbachs alpha 0.92 (Spitzer et al., 2006).

2.3.4. SF-36

We used the Short Form (SF-36) to assess general functioning. Studies confirmed the SF-36's validity and reliability (Ware & Sherbourne, 1992). The SF-36 is a self-report questionnaire that contains 36 items, which are distributed across eight scales. Scores range from 0 to 100, where higher scores indicate better general functioning. Two component scores, the Physical and Mental Health Component Scores (PCS and MHS), are made according to the international convention, using factor loadings. It was validated in the USA and the Netherlands (Aaronson et al., 1998; Ware et al., 1994). It is responsive to change (McHorney et al., 1993). Normative data are available (Garratt et al., 1994). Internal consistency was good, Cronbachs alpha 0.85 (Brazier et al., 1992).

2.4. Statistical analysis

The factorial structure was investigated with confirmatory factor analysis with CFA, the R-package Lavaan version 0.6-5 (Lavaan, 2012) in R version 3.6.3 (R Core Team, 2020). For both samples, we investigated the fit of a single-factor model and a two-factor model for the ACE-IQ-10, the first five items assessing childhood abuse and the second five items assessing signs of household dysfunction. A substantial reduction in χ^2 from baseline (preferably below significance), a Comparative Fit Index (CFI) and Tucker Lewis Index (TLI $\geq$ 0.95) and Root Mean Square Error of Approximation (RMSEA) and Root Mean Square of the Residuals (RMSA) < 0.06 were criteria used to determine appropriate model fit for the CFA. As it is also common to look at the ratio of χ^2 and df, which should be χ^2/df <2.00, we also report this indicator (Hu & Bentler, 1999). Given the binary response options to the items, we established a matrix with tetrachoric correlations and used 'scaled' indices.

Criterion validity of the scales of the ACE-IQ-10 was investigated by predicting and testing a set of differentiated associations between the scales of the ACE-IQ-10 and the PHQ-9, the GAD-7, and the SF-36 scale scores (Pearson product moment correlation). Means scores on the ACE-IQ-10 were compared between the two clinical samples, age, and between both genders. Fischer's Z test for dependent correlations was

Table 1. Gender, age and symptom scores for both samples.

	ANXDEP ($N = 289$)		SSRD ($N = 233$)	
	N	%	*N*	%
Gender (female)	166	56.3	143	61.4
	M	SD	M	SD
Age	38.7	11.1	42.5	13.4
PHQ-9	14.8	6.6	14.3	6.12
GAD-7	13.1	5.4	11.6	5.4
SF-36 PCS	12.4	3.4	11.9	3.0
SF-36 MCS	9.9	3.0	12.9	3.2

Note: PHQ-9 = Patient Health Questionnaire; GAD-7 = Generalized Anxiety Disorder scale; SF36: PCS = Physical Component Score, MCS = Mental Component Score.

performed to compare the two samples. Cases with missing data on items were not included in the CFA. Finally, the correspondence between reporting sexual abuse on the ACE-IQ-10 and in the face-to-face interview was assessed with Kendall rank correlation coefficient.

3. Results

3.1. Demographics

Gender, age and symptom scores for both samples are shown in Table 1.

Items and responses for both samples separately and combined are shown in Table 2.

We first inspected in both samples the responses on all items of the ACE. The proportion of affirmative answers was the highest for emotional neglect and emotional abuse in both samples. Scores were lowest for the imprisonment of a household member and for domestic violence against (step) mother and physical neglect in both samples. 24% of the patients reported sexual abuse, 27% in the ANXDEP sample and 21% in the SSRD sample. In general, more experiences are reported in the ANXDEP sample than in the SSRD sample.

3.2. Confirmatory factor analysis

For both samples, we conducted two confirmatory factor analyses. We explored model fit indices for a single-factor model and a two-factor model. Table 3 shows for the single-factor model a marginally good fit in the ANXDEP sample and sufficient fit in the SSRD sample. Only the SRMR indicator was too high with .09 as < .08 indicates a good fit. As expected from reports of the factor structure of earlier versions of the ACE-IQ (Ford et al., 2014), a two-factor solution (with item 1–5 comprising the first and item 6–10 the second factor) had a significantly better fit in the ANXDEP sample and a slightly better fit in the SSRD sample. Taken together, these results warrant calculating a total sum score over the ten items and distinguishing two subscales as separate scores in the ACE-IQ-10.

The first five items form a reliable scale (Cronbach's alpha, based on tetrachoric correlations, $\alpha = .76$ and $\alpha = .73$ for ANXDEP and SSRD respectively) and describe negative experiences that were directed to the respondent. The second five items describing events that happened to family members were less reliable ($\alpha = .67$ and $\alpha = .55$) suggestive of family dysfunction, which may have affected the respondents indirectly. These two factors are also substantially interrelated ($r = .56$). Cronbach's $\alpha = .89$ for the entire 10-item scale.

Figure 1 shows the structure of the two-factor model with loadings for the items for the ANXDEP sample. The structure for the SSRD sample is similar. Table 4 shows internal consistency, composite reliability and variance for the factors.

Table 4 also shows that the reliability of the first factor was higher than the second factor and reliability was higher in the ANXDEP sample than in the SSRD sample. The high MSV value for factor 1 reveals that there were highly concordant item pairs (items 1 and 2).

Furthermore, following our third research question, we investigated whether the two subscale scores were differentially related to demographics including age and gender and to diagnostic information or severity of psychopathology. Regarding age effects, no relation between age and ACE-IQ-10 scores was found for the total score and for the first factor ($r = -.08$, $p = .09$, $r = -.01$, $p = .08$, respectively) and a negative, albeit small effect for the second factor ($r = -.13$, $p = .002$). Findings per diagnostic classification and gender are shown in Table 5.

The mean scores in Table 5 reveal significantly more adverse childhood experiences among patients with a diagnosed depressive or anxiety disorder than those with SSRD.

Table 2. Items and number (and %) of affirmative responses.

	Sample ANXDEP ($N = 289$)		Sample SSRD ($N = 233$)		Combined ($N = 522$)	
ACE (1–5 = child maltreatment; 6–10 = household dysfunction)	*N* Yes	%	*N* Yes	%	*N* Yes	%
1. Emotional abuse	130	45	68	29	198	38
2. Physical abuse	75	26	37	16	115	22
3. Sexual abuse	78	27	49	21	125	24
4. Emotional neglect	142	49	77	33	219	42
5. Physical neglect	55	19	23	10	78	15
6. Parental divorce	104	36	47	20	151	29
7. Domestic violence against (step)mother	58	20	21	9	78	15
8. Problematic substance use of a household member	72	25	35	15	104	20
9. Mental health problems of a household member	101	35	42	18	141	27
10. Imprisonment of a household member	32	11	12	5	42	8

Table 3. CFA indicators of fit for both samples (scaled indices as response categories are dichotomous).

Sample	Model	χ^2	df	χ^2/df	CFI	TLI	SRMR	RMSEA
ANXDEP	Single factor	76.36***	35	2.18	.97	.97	.09	.06
	Two-factor	48.72*	34	1.43	.99	.99	.07	.04
SSRD	Single factor	44.54	35	1.27	.99	.98	.09	.03
	Two-factor	34.66	34	1.02	1.00	1.00	.08	.01

*$p < .05$, **$p < .01$, ***$p < .001$.
Note: CFI = comparative fit index TLI = Tucker-Lewis Index SRMR = Standardized Root Mean Square Residual RMSEA = root mean square error of approximation.

Regarding gender, no gender differences surfaced in overall ACE-IQ-10 score, abuse, or family dysfunction adversity. The marginal gender difference on abuse ($p = .06$) was predominantly due to item 3, the sexual abuse item: 32% of the females vs 14% of the males reported sexual abuse.

To further investigate the third research question regarding differential associations between ACE factors and other constructs, we established correlations coefficients between ACE-IQ-10 total and factor scores and severity of psychopathology in adulthood for both clinical groups separately. For the ANXDEP group, many subjects had missing data on the questionnaires for other constructs, as these measures were not administered. The correlations are shown in Table 6.

Comparing the association between the ACE-IQ-10 (Total, Factor 1 and Factor 2 scores) and the PHQ-9, the GAD-7, and the SF-36 component scores, we found differential associations for the three scores derived from the ACE-IQ-10: Abuse experiences had the highest correlations with other constructs. Family dysfunction had the lowest correlation, and the total score fell in between, suggesting that abuse experiences have a more significant impact than adversity due to family dysfunction in childhood. This pattern of correlations was as expected. Also, for the SF-36 there was a higher correlation between ACE-IQ-10 scales and the mental functioning component compared to physical functioning component, only to a statistically significant degree for Factor 2 in the SSRD sample ($p < .02$), which is in line with the expectation.

Regarding research question 4, the correlation between reporting a sexual trauma in childhood (at the face-to-face intake interview) and the sexual abuse item of the ACE-IQ-10 was Kendall Tau = .98; $p < .001$. A substantial number of patients, 52 (22% of the $N =$ 233 sample), reported sexual trauma at the face-to-face interview; 50 of these also responded affirmatively on the item regarding sexual abuse in the ACE. Thus, the concordance in response was almost complete.

4. Discussion

4.1. Main findings

To date, the ACE-IQ with 31 items has been validated in Western countries as well as in Chinese (Chen et al., 2022) and Malawi (Kidman et al., 2019). This study aimed to validate the Dutch version of the ACE-IQ-10, as a logical step in the validation of this international instrument, as translation into Dutch could have introduced a different way of responding. As this is the first study validating the ACE-IQ-10 as short version of the ACE-IQ, this is an innovative study. The percentages of sexual abuse in this study – 32% of the females and 14% of the males – are higher than reported in the general population, where 19.7% of women and 7.9% of men report to have suffered some form of childhood sexual abuse, according to a meta-analysis in 65 studies in 22 countries (Pereda et al., 2009; Wu & Estabrook, 2016). To compare, in a clinical sample of 178 adolescents, 44.4% reported experiencing sexual abuse (Charak et al., 2018).

The confirmatory factor analysis showed that a two-factor structure, with one factor describing experiences that directly affected the child (abuse and neglect) and a second factor describing experiences that happened to family members suggestive of family dysfunction, which may have affected the respondents indirectly, fitted the data in the ANXDEP sample, but the superiority of the two-factor model has been demonstrated less so for the SSRD sample. A single-factor model fitted as well. Thus, there is ground for calculating a total sum score over the ten items as well as distinguishing two subscales: one for the first five and one for the last five items as separate scores in the ACE-IQ-10. The ACE-IQ-10 may be meaningfully used as a total score or as two sub-scores, in psychiatric and psychosomatic outpatient treatment settings.

The two factors appeared substantially interrelated. This factor structure was found for both patient groups, in patients with depressive or anxiety disorders or PTSD, and in patients with SSRD and appeared sufficiently similar when compared between groups. The two factors had distinct patterns of association with gender, patient type, age group, self-reported psychopathology (PHQ-9 and GAD-7) and health-related quality of life (SF-36) and ACE scores in both samples were associated with psychological distress (MHS) but not with problems in physical functioning (PCS) which aligns with the samples being clinical samples of people with mental disorders seeking treatment. In the ANXDEP sample this seems to be associated with anxiety, and in the SSRD sample with anxiety and depression. Regarding age effects in

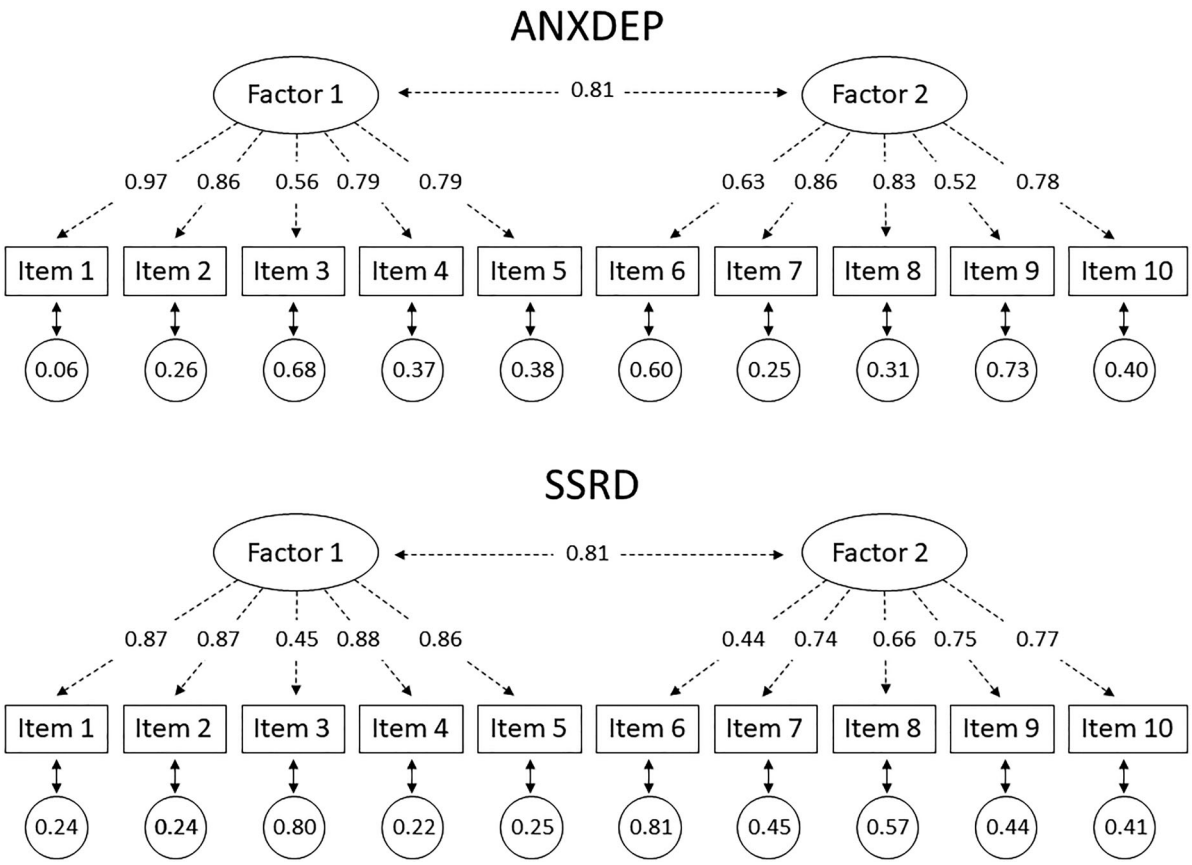

Figure 1. Path diagram of the factor structure for both samples.

the ANXDEP group, no relation between age and ACE-IQ-10 scores was found for the total score and the factor scores ($r = -.03$, $p = .54$, $r = .01$, $p = .80$; $r = -.08$, $p = .14$). In the SSRD group no relation between age and ACE-IQ-10 scores was found for the total score and first-factor score ($r = -.05$, $p = .39$, $r = .01$, $p = .84$; $r = -.08$), and a negative, albeit small effect for the second factor ($r = -.13$; $p = 0.14$), indicating the ACE score declines with age for these patients. Apparently, household dysfunction was more often reported by the younger age groups. There may be several explanations for why older age groups might report these adverse childhood experiences less frequently, such as historical cohort effects, frequency of different types of experiences and limited variance, and methodological effects having to do with item reliability and wording. A possible explanation might be a recency bias for household dysfunction in younger patients. As a comparison, a South-African prospective study in adolescents and caregivers also found that the prevalence of reported ACEs varied with the age of the respondent, with adolescents reporting much higher rates of exposure to violence, physical and sexual abuse than was reported retrospectively or by caregivers. This variation was deemed to partly reflect actual changes in circumstances with maturation, but also might be influenced by developmental stage and issues of memory, cognition and emotional state (Naicker et al., 2017). Correlation coefficients between the ACE total score, factor scores and the SF-36 Mental and Physical Component scores revealed the expected pattern of higher associations with mental as compared to physical component scores. However, the differences in association were generally small and only for the second factor in the SSRD group a statistically significant difference in association was found.

Table 4. Internal consistency (Alpha), composite reliability (CR), average variance extracted (AVE), and maximum shared variance (MSV) of factors.

		Alpha	CR	AVE	MSV
ANXDEP	Factor 1	.76	.80	.65	.94
	Factor 2	.67	.71	.54	.74
SSRD	Factor 1	.73	.77	.65	.76
	Factor 2	.55	.58	.46	.59

Alpha = Cronbach's alpha; CR = Composite Reliability; AVE = Average Variance Extracted from the lavaan package; MSV = Maximum Shared Variance is the squared highest correlation between two items within the factor; the latter three reliability indicators are more appropriate than alpha when scales are composed of items with nominal or ordinal response options; all indicators were calculated with the semTools package.

Finally, the ACE-IQ-10 childhood sexual abuse item showed strong concordance with the results of a face-to-face interview about childhood sexual abuse. Apparently, both ways of collecting this rather sensitive information yielded an almost similar result. Given the different methods used to explore sexual abuse by the ACE-IQ-10, which was by self-report at home via ROM measures, and by face-to-face interview during

Table 5. Differences between clinical groups and gender differences within clinical group.

	ANXDEP ($N = 289$)		SSRD ($N = 233$)				
Scale	M	SD	M	SD	t(520)	*p*	d
Total score	2.92	2.68	1.76	2.09	5.45	.001	0.48
Factor 1 abuse and neglect	1.66	1.63	1.09	1.41	4.25	.001	0.37
Factor 2 Household dysfunction	1.27	1.39	0.67	1.01	5.49	.001	0.48
ANXDEP							
	Males ($N = 128$)		Females ($N = 161$)				
Scale	M	SD	M	SD	t(287)	*p*	d
Total score	2.68	2.69	3.12	2.66	1.38	.17	0.16
Factor 1	1.45	1.60	1.82	1.65	1.91	.06	0.23
Factor 2	0.23	1.40	1.30	1.38	0.43	.67	0.05
SSRD							
	Males ($N = 139$)		Females ($N = 94$)				
Scale	M	SD	M	SD	t(231)	*p*	d
Total score	1.92	2.28	1.51	1.76	1.47	.14	0.20
Factor 1	1.19	1.52	1.93	1.22	1.43	.15	0.19
Factor 2	0.73	1.10	1.59	0.86	1.05	.29	0.14

intake several weeks later, risk of artifactual carryover would seem limited. Nevertheless, further research would be needed to consolidate this result.

4.2. Strengths and limitations of the study

Compared to the early ACE-Q checking 10 items that shortly mention childhood adverse experiences (Choi et al., 2020), this is the first study establishing the factor structure of the Dutch version of the WHO ACE-IQ-10 as it was developed in 2015. A strength of the study is that the factor structure was confirmed in two distinct patient samples. The findings establish support for the two-factor structure that was reported previously for the ACE-IQ (Afifi et al., 2020; Anda & Felitti, 1998; Felitti et al., 1998; Gette et al., 2022; Nishimi et al., 2020; Zarse et al., 2019). However, there is also support for use of the total score. The good psychometric properties suggest that the ACE-IQ-10 may be a valid short questionnaire to use in the clinical setting and in further research. In addition, the ACE-IQ-10 childhood sexual abuse item showed almost perfect concordance with the results of a face-to-face interview about childhood sexual abuse.

While the retrospective character of the assessment of childhood experiences by a self-report questionnaire, such as the ACE-IQ-10, can be criticized and might be a limitation of any research, a series of studies in the literature also supports the validity of retrospective reporting to assess childhood experiences (Hardt & Rutter, 2004). Hence, the findings suggest that the ACE-IQ-10 may be a robust measure to explore a variety of childhood adverse experiences, including childhood sexual abuse. However, in terms of generalizability, it is a limitation that this study was conducted in clinical samples. Also, it is a limitation that the number of SF36 measurements was lower than the PHQ9 and GAD7. Further studies are needed to investigate the psychometric properties of the ACE-IQ-10 in the Dutch general population.

4.3. Clinical implications

The Dutch ACE-IQ-10 is short self-report scale with good psychometric properties that could be used as a screener during the intake. If childhood adverse experiences are reported, interviewing could follow to explore childhood abuse or family dysfunction further, investigating its potential effect on the present problems, and consider possible implications for the treatment that will be offered. This proposed procedure aligns with the approach of two-staged screening by Longford (2015) that would have as aim to establish if there is a link with the current problems which might, for instance, warrant trauma therapy. The merit of this approach would be that it provides an efficient method to systematically explore a possible

Table 6. Correlations between ACE total and factor scores and severity of psychopathology in adulthood.

	ANXDEP ($N = 289$)						SSRD ($N = 233$)					
				SF-36						SF36		
n	52	52	38				226	229	233			
Scale	PHQ-9	GAD-7	PCS	MCS	Z	*p*	PHQ-9	GAD-7	PCS	MCS	Z	*p*
Total score	.16	.19	−.00	.26*	1.06	.14	.29***	.24***	.08	.2**	1.34	.09
Factor 1	.22	.27*	.10	.36*	1.19	.11	.29***	.23***	.12	.18***	0.74	.23
Factor 2	.04	.05	−.10	.06	0.66	.25	.20**	.20**	.01	.20**	2.17	.02

* $p < .05$, ** $p < .01$, *** $p < .001$; Z = Fischer's Z test for dependent correlations.

Note: PHQ-9 = Patient Health Questionnaire; GAD-7 = Generalized Anxiety Disorder scale; SF36: PCS = Physical Component Score; MCS = Mental Component Score.

role of ACE and counteract that ACEs might otherwise be overlooked at the intake of the patient.

The differential effect of gender, age and diagnostic classification regarding the two factors underscores the importance of distinguishing the two types in a systematic exploration of adverse childhood experiences, especially the direct experience of abuse, or household dysfunction. The ACE-IQ-10 is a short questionnaire relevant for such a purpose in clinical use and research.

4.4. Implications for research

The mean ACE-IQ-10 scores reveal more adverse childhood experiences among patients with depression or anxiety compared to patients with SSRD, and abuse experiences appear to have a more significant impact than adversity due to family dysfunction in childhood on anxiety, depression and quality of life scores. This finding should be further explored in future research with patients with SSRD with anxiety and depression but also with other psychiatric disorders. More research is needed to explore further if the two factors of ACE-IQ-10 are related to different symptomatology, and how this could be incorporated into future clinical work, including allocation of interventions. A future research topic would be to explore a threshold for both subscales for abuse or neglect and household dysfunction, given that an ACE total score of 4 or more has been associated with psychopathology (Dube et al., 2002; Edwards et al., 2003; Felitti et al., 1998). Would one negative experience already predict adult psychopathology? Or would higher levels be needed for that to occur? Furthermore, an interesting topic for research is resilience concerning ACE. Given the limitations of recall in the case of retrospective research, prospective research designs would be useful, such as exploring whether the ACE-IQ-10 subscales scores have prognostic value for treatment outcome. Such a study has been performed for childhood sexual abuse as established by interview and treatment outcome in conversion disorder (Van der Feltz-Cornelis, Allen, et al., 2020); the performance of the ACE-IQ-10 subscales in this context could be explored similarly. Finally, an ACE questionnaire variant with similar items exploring adverse experiences in adulthood, i.e. lifetime adverse experiences experienced after age 18, would be useful for research and clinical practice. Such a questionnaire has indeed been developed in the Netherlands, but its validation is still underway.

5. Conclusion

This study established the factor structure of the Dutch version of the ACE-IQ-10 and found support for the two-factor solution that was established in the ACE-IQ, but also support for using the total score. Support for the structure was established in two distinct patient samples. It shows clear potential of the ACE-IQ-10 for further research and clinical use.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

The data are owned by a third party that does not publicly share data. However, interested parties will be able to obtain data upon request as follows. Researchers can submit a research plan, which describes the background and methods of a proposed research question, and a request for specific data of the database used for this study to answer the research question. After approval of the research plan by the principal investigator and the director of GGz Breburg a deidentified minimal dataset can be obtained. Information can be requested by contacting the principal investigator.

Ethics approval and consent for participation

For the present research, we used data from two samples that were collected previously (Kroenke et al., 2001; Van der Feltz-Cornelis et al., 2019; Van der Feltz-Cornelis, Bakker, et al., 2020). According to the World Medical Association Helsinki Declaration (2022), Dutch law, and the Dutch Central Medical Ethical Committee, no explicit informed consent is required for the use of clinical or administrative data that are routinely collected in the context of treatment provision and anonymized for research. This applied to the samples used in this study. As procedure, for administrative and treatment purposes at intake, patients were informed that Patient Reported Outcome Measures (PROM) and medical data obtained during intake and treatment could be used for research evaluation on an anonymised basis, unless they indicated their dissent. In case of dissent, this was notified in the patient file. Patient files of dissenting patients were excluded from the study. Data were coded in order to create an anonymised dataset. The Institutional Research Board (IRB) of GGz Breburg waived the need for written informed consent accordingly and approved the general study protocols regarding collection of data for the samples used in this study with routine outcome monitoring being integral to the treatment process (no written informed consent was required) (Van der Feltz-

Cornelis et al., 2019; Van der Feltz-Cornelis, Allen, et al., 2020; Van der Feltz-Cornelis, Bakker, et al., 2020).

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