Psychometric properties of the Hungarian Childhood Trauma Questionnaire Short Form and its validity in patients with adult Attention-Deficit Hyperactivity Disorder or Borderline Personality Disorder

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Research Article

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Abstract

Background

A convincing body of research has identified childhood traumatization as an important etiological factor for psychiatric disorders, including adult attention-deficit hyperactivity disorder (aADHD) and borderline personality disorder (BPD). The aim of this study was to examine the psychometric properties of the Hungarian version of the Childhood Trauma Questionnaire Short Form (H-CTQ-SF) and to investigate the differences between patients diagnosed with aADHD and BPD in terms of early traumatization.

Methods

Altogether 765 (mean age = 32.8 years, 67.7% women) patients and control subjects were enrolled from different areas of Hungary. Principal component analysis and confirmatory factor analysis were carried out to explore the factor structure of H-CTQ-SF, and test the validity of the five-factor structure. Discriminative validity was assessed by comparing clinical and non-clinical samples. Subsequently, aADHD and BPD subgroups were compared with healthy controls to test for alterations in aADHD not attributable to comorbid BPD, by excluding comorbid cases. Convergent validity was explored by measuring correlations with subscales of the Personality Inventory for DSM-5 (PID-5).

Results

The five scales of the H-CTQ-SF demonstrated adequate internal consistency and reliability values. The five-factor model fit the 27-item Hungarian version well, after the removal of one item from the physical neglect scale because of its cross loading onto the emotional neglect subscale. The H-CTQ-SF effectively differentiated between the clinical and non-clinical samples. The BPD group showed significant differences in each CTQ domain compared to the healthy control group, while there were no such differences in the aADHD group. All CTQ domains, except for physical abuse, demonstrated medium to high correlations with PID-5 emotional lability, anxiousness, separation insecurity, withdrawal, intimacy avoidance, anhedonia, depressivity, suspiciousness, hostility subscales.

Conclusions

This study provides data about the psychometric properties of the H-CTQ-SF, an easy-to-administer, non-invasive, ethically sound questionnaire. In aADHD patients without comorbid BPD, low levels of traumatization in every CTQ domain are demonstrated comparable to healthy control individuals. Thus, elevated level of traumatization found in former studies of aADHD might be a consequence of comorbid BPD. Our findings also support the role of emotional neglect, emotional abuse and sexual abuse in the development of BPD.

Background

Early trauma in the background of psychopathology

Several lines of research suggest that psychopathology emerges as the result of complex interactions between environmental risk factors and genetic vulnerability (1–3). Gene-environment interaction studies in mental disorders suggest that susceptibility to environmental factors are partially based on individual genetic variation. The most prominent and frequently reported environmental risk factors are traumatic experiences during childhood, especially abuse and neglect. Across various community samples, exposure to at least one form of abuse in childhood was 26.6% and 31.7% for females and males, respectively (4). According to a representative survey in the U.S. general population, the prevalence of sexual abuse was 14.2% for men, and 32.3% for women, while prevalence of physical abuse was 19.5% for women and 22.2% for men (5). Population-based studies show that 8–25% of children in high-income countries and 10–39% of children in middle-income countries witness interpersonal violence in their homes during childhood (6, 7).

Several studies indicate that childhood adversities are associated with a wide range of psychiatric morbidities (8), i.e., mood disorders (9–11), anxiety disorders (12–14), substance use disorder (15, 16), and psychosis (17). Non-suicidal self-harm (18), suicidal ideation, and suicidal behavior have also been connected with childhood maltreatment in several populations (19, 20). Thus, a growing demand has developed for the retrospective detection of early adverse events in order to recognize and prevent the long-term consequences of childhood adversity and maltreatment. As a possible example for the underlying processes, the extreme stress caused by various adversities can disrupt early brain development and affect the development of the neurohormonal and immune systems (21–23). In addition to the general...
Early life traumatization has also been reported to influence personality development and adult personality structure, affecting several personality domains. Negative affectivity, detachment, and psychoticism have been shown to correlate with early traumatization, and mediate between childhood adversities and internalizing symptoms (25). These findings represent the basis of the alternative model for personality disorders (AMPD) in the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) Section III (26), and the Personality Inventory for DSM-5 (PID-5) (27, 28).

Impulsivity has also been linked to early traumatic experiences (29). It is a core symptom and diagnostic criterion of both attention-deficit hyperactivity disorder (ADHD) and borderline personality disorder (BPD). The higher-than-chance association between these two disorders can be attributed to shared genetic and environmental vulnerability (30, 31). The partially shared etiology could also explain overlapping symptom presentation, e.g., impulsivity and emotion dysregulation (31, 32).

The etiology of BPD is influenced by both genetic and environmental factors, such as traumatic childhood experiences, which most probably interact with each other (33–35). In the extensive twin study of Distel et al. (2008) genetic influences explained 42% of the variation, while environmental influences were accountable for the remaining 58% of variation in BPD symptoms in both men and women, with comparable estimates across the samples from the Netherlands, Belgium, and Australia (36).

Conversely, ADHD has a relatively high heritability rate of 70–80% (37, 38). Recent genetic models emphasize the interaction with environmental factors in ADHD as well, including early traumatization. The retrospective study of Rucklidge and co-workers (2006) demonstrated higher prevalence of emotional abuse or emotional neglect in aADHD patients, while sexual abuse and physical neglect was higher only in women with aADHD (39). However, it is still not yet clear, whether emotional or physical abuse can function as a pure etiological factor, or might be a consequence of rearing a child struggling with emotional dysregulation, constituting a challenging experience for the parents. To evaluate the role of early traumatization in these disorders, it is also important to take into consideration the high rate of comorbidity between ADHD and BPD. Several prospective studies showed that childhood ADHD was a risk factor for the subsequent development of BPD (40–43), with rates of BPD among adults with ADHD ranging from 19–37%. In clinical samples of BPD patients, the prevalence of aADHD is higher than in the general population, ranging from 16–38% (44, 45).

In summary, many psychiatric disorders including BPD and aADHD have been associated with childhood maltreatment. Moreover, it is important to assess the history of childhood adversity and trauma not only in clinical and therapeutic settings, but also for research purposes. Therefore, there is a pressing need for reliable assessment tools that can be easily administered in an ethically sound and non-intrusive way, while meeting validity requirements for relevant types of maltreatment. Furthermore, these assessment tools should be sensitive to the degrees of severity within different types of maltreatment (46).

Measuring Early Traumatization

Measuring early traumatization is a challenging and critical element of clinical evaluation (47), as traumatization in the past influences not only the clinical course of psychiatric disorders (i.e., greater symptom severity), but also treatment response to pharmacotherapy and psychotherapy (48). There are concerns in the retrospective assessment of childhood maltreatment, e.g., memories can be distorted for several reasons, partially because of the long time lag. In addition, children are usually exposed to only one family environment and do not experience other caregiving circumstances. As a consequence, they consider maltreatment as normal, at least to a certain extent, and it takes time to realize that “things shouldn’t have happened in the way they happened” and to acknowledge trauma not as a norm. Sensitive characteristics of trauma, e.g., shame, and other negative emotions that accompany these psychological reactions, such as minimization and denial can result in reluctance or inability to communicate problems. There are also ethical and therapeutic concerns about exploring traumas, since they can activate memories and emotional reactions, such as anxiety, flashbacks, and dissociation.

Early traumas can be measured either by self-rated questionnaires or by expert-rated interviews. Questionnaires have the advantage of being economical, easily administered and scored, and assuring anonymity, which might reduce the chance of distorted responses due to shame arising in association with traumas. Retrospective trauma interviews can provide a richer and more detailed description of early traumatic experiences.

The most thoroughly validated, and extensively used instrument to measure the experience of early trauma is the Childhood Trauma Questionnaire Short Form (CTQ-SF; (49). The CTQ-SF is a retrospective 28-item self-report questionnaire that measures childhood exposure to traumatic experiences in five distinct dimensions: Emotional Abuse (EA), Physical Abuse (PA), Sexual Abuse (SA), Emotional Neglect (EN),
and Physical Neglect (PN). By measuring the five types of abuse and neglect, it also takes into consideration the co-occurrence of different types of abusive experiences and individual traumas (49). It is short and relatively non-invasive, as it asks about the frequency of experiences and events, not their specific details, to maximize the chances of recognizing abuse and neglect. The CTQ-SF has been shown to have good reliability and validity in clinical and community samples (50, 51). The 5-factor structure of the CTQ-SF has been confirmed in several studies (50, 52–58).

The Early Trauma Inventory (ETI) was created by Brenner et al. (2000) as a comprehensive expert-rated interview (59). A self-rated version (ETI-SR) was developed subsequently, and a brief self-rated short form was made after a psychometric analysis identified redundant items (60). ETISR-SF is a valid instrument for retrospective self-assessment of childhood trauma in diverse populations and cultural contexts and has good test-retest reliability. It has been translated with preserved psychometric properties to several languages. Because it measures several different trauma domains as well as the age of onset, duration and frequency of traumatic events, the perpetrator’s motivations, and the emotional impact of the traumas, it could be used in trauma research and specialized clinical settings (61).

Among other trauma interviews, the Childhood Experience of Care and Abuse (CECA) (62) and the Childhood Trauma Interview (CTI) (63) have received the most empirical attention. Compared to many other trauma interviews, the CECA and the CTI assess a broader range of traumatic childhood events. The CECA has been extensively validated (62, 64, 65), while the validation of the CTI has been limited to drug and alcohol user samples (63). The PID-5, which has been developed according to the AMPD, is a personality questionnaire rather than an instrument for the assessment of traumatization per se. However, recent studies reported close associations between several PID-5 subscales (e.g., anxiousness, depressivity, suspiciousness, hostility, negative affectivity, detachment) and early traumatization (25, 66, 67).

There has been a lack of non-invasive, easy to administer tools with good reliability and validity for detecting childhood adverse events in Hungarian language. Given the advantages of CTQ discussed above, we chose this questionnaire to be translated and validated. We also aimed to evaluate the differences between the level of early traumatization in aADHD and BPD patient groups. To our best knowledge, no previous study measured the level of early traumatization in aADHD after exclusion of comorbid BPD. We hypothesized that the H-CTQ-SF will be able to discriminate between clinical and non-clinical samples, and subscales will show differences between patients with aADHD and BPD.

**Methods**

**Participants**

As the first step of the validation process of the instrument, we enrolled patients and control subjects from the capital city and a middle-size town, the centre of the Southern region of Hungary in order to have subjects from rural areas as well. Thus, participants were recruited at two collaborating sites, University of Pécs, Department of Psychiatry and Psychotherapy, and Semmelweis University, Department of Psychiatry and Psychotherapy. Both sites provided clinical and non-clinical samples, and were granted ethical approval by relevant research ethics committees, all participants provided written informed consent.

A community sample of 358 subjects without any psychiatric history was recruited in Pécs, in order to test the general feasibility of the H-CTQ-SF and to make some minor changes to improve the translation. This community sample was complemented by 171 psychiatric inpatients recruited in Pécs, who were diagnosed according to DSM-5 criteria. The rates of primary diagnoses in this psychiatric inpatient group were the following: 85.4% mood disorders, 21.2% personality disorders, 15.8% substance use disorders, and 11.7% other. The psychiatric patients enrolled in Budapest were diagnosed with either aADHD (n = 78), or BPD (n = 60) as a main diagnosis. In the aADHD group 53.8%, in the BPD group 93.5% of the subsample had at least one comorbid BPD diagnosis. The secondary diagnoses in the aADHD group were the following: mood disorders 38.5%, substance use disorders 23.1%, anxiety disorders 22%, PTSD 2.2%, obsessive compulsive disorder 1.3%, eating disorder 1.3%, somatic symptom disorder 1.3%, personality disorder other than BPD 11%. In the BPD group comorbidities included mood disorder 82.3%, anxiety 75.8%, personality disorder other than BPD 40.3%, substance use disorder 30.6%, PTSD 27.4%, eating disorder 21%, obsessive compulsive disorder 8.1%, somatic symptom disorder 4.8%. The screened control group recruited in Budapest consisted of 98 healthy subjects without psychiatric history, who were screened thoroughly by a variety of assessment tools (see below).

Exclusion criteria were the same at both sites: psychosis, neurocognitive or developmental impairment, mental retardation or insufficiency of reading and writing, limiting the abilities of informed consent and assent. Altogether 765 participants were included in the study. Table 1 shows the demographic characteristics of the total sample and each study group.
Table 1
Sociodemographic characteristics of the sample, the aADHD, BPD, screened control, psychiatric inpatient groups, and community sample.

<table>
<thead>
<tr>
<th></th>
<th>Total n = 765</th>
<th>aADHD group n = 78</th>
<th>BPD group n = 60</th>
<th>Screened control group n = 98</th>
<th>Psychiatric inpatient group n = 171</th>
<th>Community sample n = 358</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (SD)</td>
<td>32.83 (11.65)</td>
<td>26.5 (4.59)</td>
<td>26.2 (4.63)</td>
<td>26.39 (4.60)</td>
<td>37.73 (13.94)</td>
<td>35.20 (12.17)</td>
</tr>
<tr>
<td>Min</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Max</td>
<td>75</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>75</td>
<td>70</td>
</tr>
<tr>
<td>Gender n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>243 (31.8)</td>
<td>46 (59.0)</td>
<td>13 (21.7)</td>
<td>42 (42.9)</td>
<td>60 (35.1)</td>
<td>82 (22.9)</td>
</tr>
<tr>
<td>Female</td>
<td>518 (67.7)</td>
<td>32 (41.0)</td>
<td>46 (76.7)</td>
<td>0 (0)</td>
<td>110 (64.3)</td>
<td>274 (76.5)</td>
</tr>
<tr>
<td>Non binary</td>
<td>2 (0.3)</td>
<td>0 (0)</td>
<td>1 (1.7)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>2 (0.6)</td>
</tr>
<tr>
<td>Missing</td>
<td>2 (0.3)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>2 (0.6)</td>
</tr>
<tr>
<td>Education n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school (8 years)</td>
<td>33 (4.3)</td>
<td>1 (1.3)</td>
<td>5 (8.3)</td>
<td>1 (1)</td>
<td>22 (12.9)</td>
<td>4 (1.1)</td>
</tr>
<tr>
<td>Secondary school (8 + 2 years)</td>
<td>45 (5.9)</td>
<td>1 (1.3)</td>
<td>3 (5.0)</td>
<td>0 (0)</td>
<td>31 (18.1)</td>
<td>10 (2.8)</td>
</tr>
<tr>
<td>Graduation (8 + 4 years)</td>
<td>299 (39.1)</td>
<td>40 (51.3)</td>
<td>34 (56.7)</td>
<td>48 (49.0)</td>
<td>46 (26.9)</td>
<td>131 (36.6)</td>
</tr>
<tr>
<td>Finished BSc/MSc/PhD</td>
<td>359 (46.9)</td>
<td>36 (46.2)</td>
<td>18 (30.0)</td>
<td>0 (0)</td>
<td>43 (25.1)</td>
<td>213 (59.5)</td>
</tr>
<tr>
<td>Missing</td>
<td>29 (3.8)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>29 (17.0)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Subjects in the aADHD, the BPD and the screened control group were enrolled at the Budapest site. Subjects in the psychiatric inpatient group and the community sample were recruited in Pécs.

Psychiatric Assessment

A board-certified psychiatrist or clinical psychologist interviewed patients of the BPD and aADHD groups at the Budapest site using MINI 5.0 (68) and SCID-5-PD (69) interviews to validate the clinical diagnosis and detect comorbid psychiatric disorders. Comorbid BPD cases detected by the SCID-5-PD were excluded from the aADHD group, while ADHD symptoms detected by the MINI 5.0 resulted in exclusion from the BPD group to ensure the exclusivity of the two main diagnoses, in order to detect the level of early trauma in the aADHD group not attributable to comorbid BPD. BPD patients who had no aADHD diagnosis in the past, but met 3 or more attention deficit/hyperactivity symptoms according to the DSM-5 criteria of ADHD, were excluded as well. The screened healthy control group recruited at this site, consisted of 98 healthy subjects without any psychiatric history, not using drugs regularly, and screened by Derogatis Symptom Scale (SCL-90) (70) and Conners’ Adult ADHD Rating Scales (CAARS, 66-item version) (71). To meet inclusion criteria, their Global Severity Index score had to be below 70 (t points < 70), furthermore, two of the Inattention, Hyperactivity and Impulsivity CAARS domains needed to be below 70.

The Personality Inventory for DSM-5 (PID-5 by APA, 2013 (27, 28) was administered in each group. This questionnaire was developed for the detailed measurement of personality traits in the background of personality disorders in accordance with the dimensional approach of personality disorders. Twenty-five personality traits were assessed, creating 5 higher-order domains: negative affectivity, detachment, disinhibition, antagonism, and psychotism.

The CTQ short form is suitable for assessing five types of child and adolescent abuse and neglect. The questionnaire takes 5–10 minutes to complete and can be used with clinical and normative subjects, both individually and in groups. It consists of 28 items on five scales: emotional abuse (EA), physical abuse (PA), sexual abuse (SA), emotional neglect (EN), and physical neglect (PN). In the original English version, each scale contains five items. Three additional items are used to measure the tendency of minimizing or denying abuse, these three items form the validity subscale. These items can be used effectively to detect the denial or underestimation of trauma, and thus reduce the probability of bias. The subject evaluates each item on a Likert scale from 1 to 5 based on the frequency of each life event that
occurred before the age of 18 (never = 1, rarely = 2, sometimes = 3, often = 4, very often = 5). The questionnaire also contains reversed items. Thus, a minimum of 5 and a maximum of 25 points can be entered on each scale.

The items of the validity scale are also evaluated on a Likert scale from 1 to 5, but the scores are evaluated differently: the scale values are converted to binary values (0 and 1). For a score of 1 to 4 for each item, 0 point is given, while for choice 5, 1 point is given. Therefore, the three items in the validity scale can add up to 0, 1, 2, and 3 points. In the case of a score of 0, the questionnaire and the completion can be considered valid, while in case of a score of 1 to 3, denial or underestimation of abuse is very likely.

Any score from 1 to 3 on the validity scale suggests the possible underreporting of maltreatment (false negatives). This indicator is particularly relevant when the test profile consists of very low trauma scores in most maltreatment areas, a profile suggesting a tendency to pervasively minimize or deny maltreatment. Under these circumstances, the profile of low trauma scores should be interpreted with caution, and other sources of information should be used to verify the absence of abuse and neglect.

The Hungarian version of the measuring instrument was translated using the “reverse” method, during which the professional translation was carried out from English into Hungarian, followed by back translation by a bilingual native speaker. The two questionnaires were then compared.

Data analysis

SPSS version 27 was used for all statistical analyses, except for confirmatory factor analysis. Internal consistency was calculated using Cronbach’s alpha (72). Principal component analysis was carried out to explore the factor structure of H-CTQ-SF. Confirmatory factor analysis (CFA) was performed by using the JASP 0.16.1.0 program in order to examine the translated version of the CTQ-SF and its fit with the five-factor model (50, 52–58). Since the chi-square test is susceptible to sample size, even a small difference will result in a significant difference as the sample size increases, this study used four fitting indicators: the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). The criteria used to evaluate model fit were: CFI and TLI ≥ .95, whereas RMSEA and SRMR ≤ .05. An advantage of RMSEA is that a confidence interval can be calculated, which provides more information regarding model fit than a point estimate. The upper bound of this confidence interval should be ≤ .10 for an acceptable model fit (73). Discriminative validity was tested by comparing the clinical and non-clinical samples using Mann–Whitney U test, and comparing the BPD, aADHD and screened control groups using ANOVA analyses and Bonferroni post hoc tests. Correlation analyses were carried out between H-CTQ-SF subscales, and separately, between H-CTQ-SF subscales and PID-5 domain scores. The domains of the PID-5 used for correlation analyses were chosen based on clinical relevance, and recent studies (25, 66, 67).

Results

Minimization and denial of traumatization

First, we analysed the H-CTQ-SF validity scale. The role of the 3 validity is to identify responses minimizing or denying abuse and neglect, thus ensuring validity of the analysed data. Of the 765 completed questionnaires 599 were valid, representing 78.3% of the total sample. Within the whole sample, the clinical and non-clinical subgroups were not statistically different in terms of valid fillings χ² (df = 1, n = 765) = 3.228, p = .072, φ = .065. From this point on, only valid fillings were used for analyses.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Comparison of the clinical (aADHD, BPD and psychiatric inpatient group) and the non-clinical (screened control group, population sample) samples for valid fellings.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>n = 765</td>
</tr>
<tr>
<td>Valid n (%)</td>
<td>599 (78.3)</td>
</tr>
<tr>
<td>Non - valid n (%)</td>
<td>166 (21.7)</td>
</tr>
</tbody>
</table>

Statistics: chi-square test, χ² (df = 1, n = 765) = 3.228, p = .072, φ = .065.

Reliability And Internal Consistency

Internal consistency coefficients for the CTQ scales were computed as Cronbach’s alpha (Cronbach, 1951) values for both validation samples (Table 3). Reliability coefficients of the H-CTQ-SF scales in the total sample ranged between .65-95. both in the clinical and non-
clinical sample, indicating an adequate internal consistency of the H-CTQ-SF.

Table 3
Cronbach's alpha values of the 5 scales of H-CTQ-SF measured in the total valid, clinical and non-clinical sample.

<table>
<thead>
<tr>
<th>Scale – Cronbach's α</th>
<th>Total n = 599</th>
<th>Clinical sample n = 252</th>
<th>Non-clinical sample n = 347</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional abuse (EA)</td>
<td>.880</td>
<td>.870</td>
<td>.874</td>
</tr>
<tr>
<td>Physical abuse (PA)</td>
<td>.873</td>
<td>.863</td>
<td>.882</td>
</tr>
<tr>
<td>Sexual abuse (SA)</td>
<td>.934</td>
<td>.926</td>
<td>.946</td>
</tr>
<tr>
<td>Emotional neglect (EN)</td>
<td>.876</td>
<td>.842</td>
<td>.886</td>
</tr>
<tr>
<td>Physical neglect (PN)</td>
<td>.651</td>
<td>.636</td>
<td>.611</td>
</tr>
</tbody>
</table>

Principal Component Analysis

Principal component analysis (PCA) was carried out on the total valid sample of 599 cases. Pair-wise exclusion of cases was used to handle missing values. Since the subscales were known from previous studies to be inter-correlated (49), oblimin rotation was applied. We used Kaiser's eigenvalues > 1; Cattell's scree test, and parallel analysis using both mean and 95th percentile eigenvalues (74, 75) to determine the number of factors to retain. The five-factor solution accounted for 68% of the variance (Table 4).
Table 4
Results of the principal component analysis (PCA) using the five-factor solution (R² = .68) with oblimin rotation and Kaiser normalization.

<table>
<thead>
<tr>
<th>When I was growing up...</th>
<th>EN</th>
<th>SA</th>
<th>PA</th>
<th>PN</th>
<th>EA</th>
</tr>
</thead>
<tbody>
<tr>
<td>13* People in my family looked out for each other.</td>
<td>-.785</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28* My family was a source of strength and support.</td>
<td>-.784</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19* People in my family felt close to each other.</td>
<td>-.778</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5* There was someone in my family who helped me feel that I was important or special.</td>
<td>-.726</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7* I felt loved.</td>
<td>-.724</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2* I knew that there was someone to take care of me and protect me.</td>
<td>-.618</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 My parents were too drunk or high to take care of the family.</td>
<td>.432</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 Someone tried to touch me in a sexual way, or tried to make me touch him/her.</td>
<td>.963</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 Someone molested me.</td>
<td>.941</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 I believe that I was sexually abused.</td>
<td>.939</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 Someone tried to make me do sexual things or watch sexual things.</td>
<td>.912</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 Someone threatened to hurt me or tell lies about me unless I did something sexual with them.</td>
<td>.725</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 I got hit so hard by someone in my family that I had to see a doctor or go to the hospital.</td>
<td>.866</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 I got hit or beaten so badly that it was noticed by someone like a teacher, neighbour, or doctor.</td>
<td>.835</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 People in my family hit me so hard that it left me with bruises or marks.</td>
<td>.811</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 I was punished with a belt, a board, a cord, or some other hard object.</td>
<td>.699</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 I believe that I was physically abused.</td>
<td>.625</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 I had to wear dirty clothes.</td>
<td>-.822</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 I didn't have enough to eat.</td>
<td>-.666</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26* There was someone to take me to the doctor if I needed it.</td>
<td>.611</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 People in my family called me things like &quot;stupid,&quot; &quot;lazy,&quot; or &quot;ugly&quot;.</td>
<td>.729</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 People in my family said hurtful or insulting things to me.</td>
<td>.700</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 I believe I was emotionally abused.</td>
<td>.598</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 I felt that someone in my family hated me.</td>
<td>.553</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 I thought that my parents wished I had never been born.</td>
<td>.422</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EN: emotional neglect, SA: sexual abuse, PA: physical abuse, PN: physical neglect, EA: emotional abuse;

* Reversed items

Confirmatory Factor Analysis

A confirmatory factor analysis was carried out to assess the structural validity of the H-CTQ-SF in the pooled clinical (aADHD, BPD, psychiatric inpatient group) and non-clinical (screened healthy control group and population sample) groups. Although the original model reached a moderate fit (Table 5), 13 pairs of error variances, that made substantive sense, and loaded on the same scales were freed to covary: items 24 and 27 both refer to sexual abuse, items 13 and 19 refer to "people in my family", items 3 and 14 are about experiencing hurtful things, items 8 and 18 express hate, items 5 and 7 entail love and importance. Items 9, 11, 12 and 17 refer to severe corporal punishment, thus they were freed pairwise. Items 21 and 23 both refer to the coercion of sexual activities. Item 2 loaded on the EN factor instead of the PN factor, thus it was removed from the items of PN. The goodness-of-fit statistics of the five-factor model with covariation residuals and after removing item 2 proved an excellent model fit ($\chi^2 = 648.653$, df = 229, p < .001, CFI = .956, TLI = .947 RMSEA = .055,
RMSEA CI upper bound = .06, and SRMR = .044). The explained variances of the items for this model ranged from .213 (item 4 on the PN scale) to .950 (item 20 on the SA scale).

| Table 5 |
| Model fit indices of the confirmatory factor analysis models of the H-CTS-SF. |
| | χ² (df) | CFI | TLI | RMSEA [90% CI] | SRMR |
| Original 5 factor model | 1312.773 (265) | .896 | .883 | .081 [.077, .860] | .055 |
| 5 factor model with reasonable covariation residuals | 767.938 (252) | .949 | .939 | .058 [.054, .063] | .050 |
| 5 factor model without item 2 | 648.653 (229) | .956 | .947 | .055 [.050, .060] | .044 |

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

Correlation Analyses

Next, we investigated the intercorrelation of the CTQ subscales in the total valid sample (n = 599). The five scales were in moderate to strong correlation with each other, indicating the co-occurrence of the different traumas, which corresponds to previous studies (Table 6).

| Table 6 |
| Spearman correlation coefficients between the CTQ subscales. |
| | EA | PA | SA | EN | PN |
| EA | .581*** | .347*** | .674*** | .581*** |
| PA | .305*** | .460*** | .430*** |
| SA | .252*** | .294*** |
| EN | .683*** |

EA: emotional abuse, PA: physical abuse, SA: sexual abuse, EN: emotional neglect, PN: physical neglect,

*** p < .001

We also explored the correlation of H-CTQ-SF subscales with a priori selected PID-5 subscales, namely emotional lability, anxiousness, separation insecurity, withdrawal, intimacy avoidance, anhedonia, depressivity, suspiciousness, hostility. These subscales were chosen based on previous results showing correlation with early life traumatization. The EA, the SA the EN and PN subscales of the H-CTQ-SF showed significant, low to moderate positive correlations in the aADHD, BPD and screened healthy control groups (n = 236), with each analysed subscale of the DSM-5 personality inventory indicating a good convergent validity (Table 7). Values of the PA subscale, albeit positively, were only correlated with the PID-5 anxiousness, separation insecurity, suspiciousness subscales.

<p>| Table 7 |
| Spearman correlation coefficients between H-CTQ-SF and selected PID-5 subscales in the aADHD, BPD and screened control groups (n = 236). |</p>
<table>
<thead>
<tr>
<th>Negative affectivity</th>
<th>Detachment</th>
<th>Other traits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional lability</td>
<td>Anxiousness</td>
<td>Separation insecurity</td>
</tr>
<tr>
<td>EA</td>
<td>.295***</td>
<td>.283***</td>
</tr>
<tr>
<td>PA</td>
<td>.084</td>
<td>.152*</td>
</tr>
<tr>
<td>SA</td>
<td>.221**</td>
<td>.234**</td>
</tr>
<tr>
<td>EN</td>
<td>.232**</td>
<td>.242**</td>
</tr>
<tr>
<td>PN</td>
<td>.173*</td>
<td>.139</td>
</tr>
</tbody>
</table>
EA: emotional abuse, PA: physical abuse, SA: sexual abuse, EN: emotional neglect, PN: physical neglect, * p< 0.05 ** p<0.01 *** p < .001

Discriminative Validity Of The H-CTQ-SF

Using the Mann–Whitney U-test for pairwise comparisons, the clinical and non-clinical samples demonstrated significant differences in each CTQ subscale (Fig. 1).

The sample recruited at the Budapest site consisted of BPD, aADHD and screened control groups, in which subjects with comorbid aADHD and BPD, or healthy control subjects with subclinical symptoms were excluded as a result of the rigorous screening process. Using ANOVA analyses and Bonferroni post hoc tests, the BPD group differed significantly from the control group in each CTQ scale (EA, SA, EN scales p < .001, PA, PN scales < .01), while there was no significant difference between the aADHD and the screened control group in any of the CTQ subscales. The BPD group had significantly higher values than the aADHD group in the EA, SA (p < .001), and EN (p < 0.01) scales, but was not different in the PA and PN scales (Fig. 2).

Discussion

The main findings of this study are the following: 1. The five scales of H-CTQ-SF demonstrated adequate internal consistency and reliability that were similar to the English version of CTQ-SF. 2. The hypothesized five-factor model of the CTQ-SF fits well with the 27-item Hungarian version of the CTQ-SF, even after the removal of one item from the PN scale, due to its cross loading onto the EN subscale. 3. The H-CTQ-SF effectively differentiated between clinical patients and the population sample, and also between the screened healthy control, aADHD and BPD groups. Early trauma in the aADHD group did not exceed the levels seen in healthy controls. 4. As a convergent validity measure, the H-CTQ-SF showed good correlation with relevant domains of the PID-5 questionnaire.

Translation, internal consistency and factor structure of the H-CTQ-SF

When translating the questionnaire to Hungarian, we faced the issue of double denial in item 10 of the validity scale. After testing the H-CTQ-SF in a community sample, we realized, that understanding item 10 of the validity scale proved to be difficult. As this is a negative statement, the meaning of the “never” answer on the Likert scale was not clear due to the double denial used in the Hungarian language. Therefore, we replaced this item with another translation without double denial. However, there was no significant difference between the clinical and non-clinical groups in terms of valid fillings, indicating that this change has no fundamental effect on the overall applicability of the questionnaire.

Cronbach alpha values were satisfactory on the five subscales, varied on the scale of 0.651 (PN) to 0.934 (SA), showing excellent internal consistency of H-CTQ-SF. The PN scale revealed a somewhat lower alpha value, but was well over the limit for acceptable alpha-values (0.50) that can be used for group comparisons. The lower PN alpha value seems to be characteristic not only of the Hungarian version but also of the Chinese, Brazil, Swiss, Spanish, Korean, Dutch, Swedish version (46, 54–56, 58, 76, 77), and the original English version as well (49). This could indicate a weakness in the original construction of the PN subscale.

The principal component analysis resulted in a five-factor model, that explained 68% of the variance. Only two cross-loadings were observed in PCA, items 2 and 4 loaded onto the EN, instead of the PN scale. These findings are likely to be rooted partially in the Hungarian translation of the phrase “to take care”, which raises more emotional associations. However, in the original study, factor loadings for the items constituting PN were also relatively low, and one subsequent study failed to demonstrate factorial validity of the PN subscale.

Other cultural adaptations of CTQ found similar alterations in the factor structure. This problem may be related to the theoretical inhomogeneity of the “physical neglect” construct. It seems to be relevant to form a PN scale besides the EN scale, parallel to the constructions of physical vs. emotional abuse, however Gerdner and Allgulander (2009) suggested to examine the possibilities of other constructs as well (46). In our sample, item 2 (“I knew that there was someone to take care of me and protect me”) and 4 (“My parents were too drunk or high to take care of the family”) loaded on the EN scale, but in other cultural adaptations item 26 (“There was someone to take me to the doctor if I needed it”) also loaded on the EN scale instead of the proposed PN scale. All three items refer to the lack of care, which is a concept with both physical and emotional connotations. The two remaining items (1 and 6), with highest loadings on the proposed PN factor, are referring to supply of food and clean clothes. Gerdner and Allgulander (2009) suggested another construct for these items, “lack of supervision”. Based on their former findings, they proposed “neglect of care” and “neglect of supervision” as separate, although correlated factors (46).

In summary, the problematic internal consistency of the PN subscale and the low item loadings onto PN are not indicative of the weakness of the H-CTQ-SF, but instead of inconsistencies in the construct validity of the original version. Additionally, the five-factor structure
demonstrated in this study is in line with the findings of the original version, supporting cross-cultural factorial equivalence.

**Discriminative and convergent validity of H-CTQ-SF**

As shown in previous studies, the H-CTQ-SF was able to differentiate between clinical and non-clinical samples. At each trauma domain the clinical sample showed increased scores, and the differences are significant at each CTQ subscale, which supports former findings which were discussed detailed in the first chapter. Each CTQ subscale showed significant positive correlations, from acceptable to moderate, with each analysed subscale of PID-5, indicative of good convergent validity. These results are in line with findings of recent studies in this field showing that early life traumatization influences personality structure and pathology, which can mediate towards other symptom domains, e.g., dissociation or suicidal behaviour (25, 66).

**The prevalence of early traumatization in the aADHD and BPD groups**

The higher level of each trauma domain in BPD, and the lack of significant differences between aADHD and the screened control group leads to the assumption, that the elevated level of trauma found in former studies in aADHD samples might be a consequence of comorbid BPD (ref). According to our results, the environmental factors playing a role in the etiology of aADHD cannot be reliably measured by the CTQ. There was a significant difference between aADHD and BPD groups in the EA, SA and EN subscales, but they did not differ in the PA and PN subscales. According to the literature review, we were the first to compare childhood trauma level between BPD and aADHD, therefore this result can't be interpreted in the light of results from other studies. A recent review of Calvo (2020) examined the role of early traumatization in the transition of ADHD into adult BPD (78). Most of the analysed studies describe an increased risk of children with ADHD who report emotional and sexual traumatic experiences to develop BPD in adulthood. Our findings also support the role of emotional neglect, emotional abuse and sexual abuse in the development of BPD.

**Limitations**

The following limitations of our study have be considered: we have not examined patients suffering from both aADHD and BPD, thus, we have no data about the level of early traumatization in this group. Discriminative validity and correlations were only investigated in a subsample. To examine convergent validity instead of another trauma measurement tool, we applied the PID-5 personality questionnaire, which has been shown to correlate closely with trauma measures, however it doesn't measure early traumatization per se.

**Conclusions**

Until now in Hungary, there was a complete lack of psychological instruments which could be used for measuring adverse childhood experiences in a non-invasive and ethically sound way, and which had good reliability and validity. According to our results, the Hungarian version of the Childhood Trauma Questionnaire Short Form (H-CTQ-SF) has adequate internal consistency and reliability values and effectively differentiated between the clinical and non-clinical samples. Principal component analysis demonstrated that the five-factor model excellently fits the 27-item Hungarian version. The H-CTQ-SF effectively discriminated the aADHD and BPD groups, and demonstrated significant correlation with dysfunctional personality traits, measured by PID-5.

Because of its excellent psychometric properties, the H-CTQ-SF can be considered as an important clinical tool that can be used by professionals not only in the field of research, but also in patient-focused psychiatry and psychotherapy.

To our best knowledge no previous study assessed the level of early traumatization in aADHD cases without comorbid BPD. Early traumatization in this specific aADHD group was significantly lower compared to the BPD group, and was not different compared to the healthy control group. The lack of significant differences between aADHD and the control group in terms of early traumatization leads to the question, whether the elevated level of traumas found previously in aADHD samples might be a consequence of comorbid BPD. Consideration of trauma patterns and the level of childhood adversities is a crucial part of diagnostic and the therapeutic work as well. On one hand, our study fills a gap in terms of measuring the psychometric properties of H-CTQ-SF, an easy-to-administer, non-invasive, ethically sound questionnaire in Hungarian. On the other hand, our findings support the role of emotional abuse, sexual abuse and emotional neglect in the development of BPD, and also provide insight into a much less studied area, the role of traumatization in aADHD cases with and without comorbid BPD.

**Abbreviations**

aADHD: Adult Attention-deficit Hyperactivity Disorder

AMPD: Alternative Model of Personality Disorders
Declarations

Ethics approval


Consent for publication
Not applicable. The manuscript does not contain data from any individual person, only aggregate level data.

**Availability of data and materials**

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

**Competing interests**

The authors declare that they have no competing interests.

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**Authors’ contributions**

EK took part in: conceptualization, methodology, investigation, project administration, data curation, writing – original draft, funding acquisition. EC took part in: methodology, investigation, formal analysis, data curation, writing – original draft. ZN took part in: writing – review & editing, supervision, resources. KL took part in: writing - review & editing, formal analysis, Resources. BC took part in: writing - review & editing, supervision, project administration, funding acquisition. ZU took part in: conceptualization, methodology, formal analysis, writing - review & editing, supervision. MS took part in: conceptualization, methodology, formal analysis, resources, data curation, writing - review & editing, supervision. JMR took part in: conceptualization, writing - review & editing, resources, supervision, funding acquisition, correspondence. All authors read and approved the final manuscript.

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**References**


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Figures
**Figure 1**

Differences between the clinical (n = 252) and non-clinical (n = 347) samples in terms of CTQ subscales.

Legend: Values represent mean ± standard deviation. Statistics: Mann–Whitney U-test. *** p < .001
Figure 2

The CTQ subscales in BPD (n = 60), aADHD (n = 78) and screened control groups (n = 98).

Legend: Values represent mean + standard deviation. Statistics: one-way ANOVA followed by Bonferroni post hoc tests. ** p<0.01; *** p < .001