Navigating mental health complexity in residential care: Validation of the Assessment Checklist for Adolescents – Short Form

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Statements and Declarations

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Abstract

Background Adolescents in residential care who have been exposed to early interpersonal adversities exhibit a range of mental health difficulties that are not well captured by traditional assessment measures. The Assessment Checklist for Adolescents – Short Form (ACA-SF) was developed for assessing maltreatment-related symptoms observed in young people in out-of-home care.

Objective The aim of this study was to analyse the psychometric properties of the ACA-SF in a sample of adolescents in residential care.

Methods The sample was composed of 160 adolescents (49.9% males, 48.8% females, and 1.9% non-binary gender), aged 11-18, growing up in Spain.

Results The results of the factor analyses largely overlapped with the original six-factor version, with items measuring Non-Reciprocal Behaviour, Social Instability, Emotional Dysregulation/Distorted Social Cognition, Dissociation/Trauma Symptoms, Food Maintenance, and Sexual Behaviour. Our analyses, however, also revealed a seventh factor: Pseudomature Behaviours. The ACA-SF showed good internal consistency, convergent validity, and concurrent validity, as demonstrated by its associations with adverse experiences, internalizing and externalizing problems, and psychosocial correlates. Two path analysis models analysing the relationship between interpersonal experiences and mental health supported the distinctiveness of maltreatment-related symptoms.

Conclusions These findings constitute the first attempt to replicate the factor structure of the ACA-SF in adolescents in residential care. Furthermore, they support the use of this instrument as a reliable and valid standardized measure for the assessment of maltreatment-related symptoms in youth.

Keywords: Mental health; assessment; adolescents; residential care; maltreatment-related symptoms.

Introduction

Adolescents in out-of-home care (OOHC) constitute a population at risk of functional impairments and mental health problems, largely due to the chronic, repeated, and prolonged interpersonal adversities within the caregiving system experienced from an early age (Garcia et al., 2017; Leloux-Opmeer et al., 2016; Morelli & Villodas, 2022). A significant proportion of them have experienced not just one, but multiple adverse childhood experiences (ACEs) such as abandonment, child maltreatment, neglect, and household dysfunction, including exposure to domestic violence, caregiver mental illness, substance abuse or criminality (D'Andrea et al., 2012; Fischer et al., 2016). ACEs come with stress and prolonged exposure to stress may have lasting effects on neuroplasticity and the brain's architecture, leading to long-term physical, emotional, and psychological consequences (Bloom et al., 2021; Morelli & Villodas, 2022). Affected children may exhibit a range of mental health difficulties, including dysregulation of affect and behaviour, disturbances of attention and consciousness, distortion in attributions, interpersonal difficulties akin to attachment and peer relationships, dissociation, or age-inappropriate sexual behaviour (D'Andrea et al., 2012; Tarren-Sweeney, 2013).

Adolescents placed in OOHC may experience additional negative consequences from their involvement in the Child Protection System (Li et al., 2019; Strijbosch et al., 2015). Among all types of OOHC placements, residential care is more intensive and restrictive than other forms of youth care, including foster care and kinship care (Gutterswijk et al., 2020; Leloux-Opmeer et al., 2016). Young people have to cope with ACEs from home as well as with the placement in residential care – in short, they may suffer from double victimization (Goemans et al., 2016; Konstantopoulou et al., 2020). In addition to this, young people in residential care tend to experience more placement

changes compared to children in foster care (Leloux-Opmeer et al., 2016), and according to a recent meta-analysis, this placement instability increases the likelihood of mental health impairments (Maguire et al., 2024). Furthermore, studies suggest that the negative outcomes for adolescents in residential care, particularly those with multiple prior care experiences, extend beyond mental health and impact other areas of life, such as social relationships and school engagement (González-García, Lázaro-Visa et al., 2017).

Despite the high prevalence of mental health difficulties in this population, the extent to which residential care itself further compromises or harms their mental health has not been sufficiently studied, and available studies suggest that these difficulties may largely be explained by pre-care experiences (González-García, Bravo et al., 2017; Li et al., 2019). This may not always have been the case. After all, the current residential care system is vastly different from that of a few decades ago, when children were placed in large institutions or orphanages (Del Valle & Bravo, 2013). This change has also taken place in Spain, where this study took place. There is now a trend towards smaller, family-based residential facilities integrated into the community and managed by teams of qualified professionals. This model prioritizes individualized care and attention to assist children and youth in overcoming early adversities and promoting well-being and positive development (Bravo et al., 2022). Therefore, it is relevant to assess mental health needs in order to adapt intervention plans and make referrals to specialized services (Cross et al., 2021; González-García, Bravo et al., 2017).

There have been few attempts to depict the full range of developmental and mental health outcomes, including maltreatment-related symptoms, observed in adolescents in OOHC – and more specifically, those placed in residential care (Collin-Vézina et al., 2011; Westlake, 2023). Most studies of this population's mental health

have used checklists that measure difficulties commonly experienced by adolescents in the general population, notably the Achenbach measures (Child Behavior Checklist and Youth Self-Report) (ASEBA; Achenbach & Rescorla, 2001) and the Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001) (Martín et al., 2020; Rodrigues et al., 2019; Westlake, 2023). Although these measures provide valuable information about the mental health of adolescents in OOHC, they do not measure the full range of maltreatment-related mental health difficulties experienced among this population, such as those related to interpersonal and attachment problems, dissociation, or inappropriate sexual behaviour (Denton et al., 2017; Goemans et al., 2018; Tarren-Sweeney, 2007, 2013, 2014).

The Assessment Checklist for Children (ACC, Tarren-Sweeney, 2007) and the Assessment Checklist for Adolescents (ACA; Tarren-Sweeney, 2013) were designed to measure a wide range of maltreatment-related mental health difficulties exhibited by children and adolescents in OOHC. The ACA is a 105-item caregiver-report checklist that measures mental health problems manifested by youth aged 12 to 17, including behaviours, emotional states, traits, and manners of relating to others. The measure includes seven clinical scales that were empirically derived through factor analysis, labelled: Non-reciprocal Interpersonal Behaviour; Social Instability/Behavioural Dysregulation; Dysregulated Emotion/Distorted Social Cognition; Dissociation/Trauma Symptoms; Food Maintenance Behaviour; Sexual Behaviour Problems; and Suicide Discourse – as well as two scales that measure low self-esteem (Negative Self-image and Low Confidence). The ACA was originally developed using a sample of 372 adolescents in foster care and the results of the initial study showed good psychometric properties and clinical utility. While the ACA is used in clinical assessments to comprehensively assess mental health difficulties in adolescents in care, a shortened

version of the scale, namely the Assessment Checklist for Adolescents-Short Form (ACA-SF), was primarily developed as a brief treatment monitoring measure that can also be used for research purposes (Tarren-Sweeney, 2014). The ACA-SF is composed of 37 items that were derived from the original scale, excluding the Low Self-esteem scales and the Suicide Discourse scale.

Recent reviews indicate that the ACA is a promising tool for assessing maltreatment-related mental health difficulties observed in young people exposed to early interpersonal adversities (Denton et al., 2017; Luke et al., 2014; Whitt-Woosley, 2020). Several studies used this instrument for the assessment of mental health problems manifested by adolescents in care (e.g., Gatfield & Ho, 2017; Peh et al., 2022; Tarren-Sweeney, 2018). Nevertheless, studies validating the ACA-SF or studying its clinical utility are scant. A study by Eadie et al. (2020) found very few significant correlations between the ACA-SF and SDQ subscales, and concluded that, although both measures seem to capture externalizing behaviours, the ACA-SF is more adequate for the assessment of internalizing problems, attachment difficulties, dissociation, trauma, and inappropriate food behaviours in this population. Furthermore, they highlighted the clinical utility of the instrument in capturing and monitoring symptoms of attachment difficulties and complex trauma. Similarly, Selwyn et al. (2014) found that higher ACA-SF scores were associated with greater risk of adoption breakdown in a study of adolescents adopted from foster care.

The Current Study

Despite the growing awareness of maltreatment-related symptoms and ongoing efforts in the development and adaptation of assessment tools, a notable shortage of studies persists that analyse the psychometric properties of these tools (Collin-Vézina et al., 2011). Such studies are crucial for the endorsement of these tools as valuable, valid,

and reliable measures for their use in therapeutic programs implemented in residential facilities and the allocation of specialized mental health services (Collin-Vézina et al., 2011; Milne & Collin-Vézina, 2015). The validation of these measures would benefit OOHC services across the globe because the majority of care systems currently lack empirically based protocols for the assessment of maltreatment-related symptoms (Whitt-Woosley, 2020). According to the review carried out by Denton et al. (2017), the ACA stands out as a clinically and empirically derived measure designed to capture the full array of maltreatment-related symptoms observed in adolescents in OOHC. Although the ACA and ACA-SF are currently being used in many countries worldwide to clinically assess youth in OOHC, the scale's factor structure and validity have not been examined with respect to youth in residential care. This assessment tool was exclusively developed using data from adolescents in family-based care, including kinship and non-relative foster care (Tarren-Sweeney, 2013), and studies so far have mainly included samples of fostered adolescents or adopted youth (Gatfield & Ho, 2017; Tarren-Sweeney, 2023). Therefore, further research on the psychometric properties of the ACA-SF is necessary to determine its usefulness for clinical assessment and monitoring in samples of adolescents in OOHC (Milne & Collin-Vézina, 2015).

The main objective of the current study is to analyse the psychometric properties of the ACA-SF in a sample of adolescents placed in residential care in Spain and to explore whether maltreatment-related symptomatology differs across genders. Internal consistency is assessed to evaluate reliability, while the factor structure of the ACA-SF is analysed for the assessment of construct validity. Convergent validity is evaluated by correlating the ACA-SF with internalizing and externalizing problems, as well as the total problems score. Concurrent validity is explored through correlations between the

ACA-SF and a set of variables previously associated with maltreatment-related symptoms (i.e., number of residential care placements, socioemotional skills, and school engagement). Additionally, associations between interpersonal adversities with maltreatment-related symptoms, and internalizing and externalizing problems are examined using path analysis to investigate their distinctiveness and determine whether the ACA-SF could provide information beyond general measures of emotional and behavioural problems.

We hypothesize good reliability and support for the original six-factor model of the ACA-SF. Likewise, positive relations are anticipated between the total ACA-SF scale score and the number of residential care placements, as well as with internalizing and externalizing problems, while negative associations are expected with socioemotional skills and school engagement. Although no specific hypotheses are proposed between the ACA-SF scales and external criteria, differential associations are expected. Also, significant associations between ACEs and maltreatment-related symptoms are expected over and above the associations with internalizing and externalizing problems. Consistent with previous research on young people in residential care, we expect to find gender differences in maltreatment-related symptoms, with girls exhibiting more symptomatology compared to boys (e.g., Collin-Vézina et al., 2011).

Method

Study design and participants

The study sample was adolescents who participated in the VRINEP project (Risk and Needs Assessment in the Child Protection System), a longitudinal study of risk profiles and developmental trajectories of adolescents in residential OOHC in Galicia (Spain). The first wave of data collection took place between May and June 2022 with a

sample of 161 adolescents (46.6% males, 49.7% females, and 3.7% identified as non-binary) aged 11-18 (*M* = 15.22; *SD* = 1.59). The second wave commenced eight months later in January 2023 and finished in April 2023. It recruited 26 new participants, yielding a total sample of 187 participants (45.7% males, 50.5% females, and 3.2% non-binary). For the current study, only adolescents with complete data on the ACA-SF in one of the two waves were included in the analysis. Thus, the final sample included 160 adolescents aged 11- 18 (*M* = 15.17; *SD* = 1.65), with 138 assessed at T1 and 22 assessed at T2). A total of 24 residential facilities located in Galicia (NW Spain) participated in the study, including family group homes (n = 13), small residential care centres (n = 4), centres with independent living units (n = 4), and therapeutic residential care centres (n = 3). These residential facilities are managed or supported by the Child Protection System to provide care for children and adolescents who cannot remain with their families for various reasons. Family group homes are living arrangements fully integrated into the community with a maximum capacity of 8 children and youth; small residential care centres have a maximum capacity of 15 children and youth; centres with independent living units are residential facilities distributed in living units with a maximum capacity of 10 spaces per unit; and therapeutic residential care centres are specialized residential facilities for young people with mental health difficulties. The participants' characteristics are outlined in Table 1.

[Table 1]

Variables and Measures

Group care workers provided all the information regarding demographic variables and history within the child protection system through items that were specifically created for the purposes of the study. Additionally, group care workers informed about the presence and/or severity of ACEs as well as maltreatment-related

difficulties through a set of scales and questionnaires, described below. Adolescents self-reported on externalizing and internalizing problems, socio-emotional skills, and school engagement using standardized questionnaires.

Maltreatment-related Symptomatology

ACA-SF. The Spanish translation of the ACA-SF was used to measure a range of maltreatment-related symptoms in adolescents. (Tarren-Sweeney, 2014). The Spanish translation of the ACA-SF was reviewed and adapted according to the criterion checklist proposed by Hernández et al. (2020), that was derived from the International Test Commission guidelines for test adaptation. A group of three experts discussed the scale's suitability for young people in residential care while analyzing cultural and linguistic differences. After a few modifications, the adapted items were reviewed by two researchers, proficient in English and Spanish and familiar with the Spanish culture. The items were then back translated into English by a third researcher and piloted with a group of group care workers. The 37-item ACA-SF provides a total clinical score, along with information on six scales labelled: Non-reciprocal (6 items); Social Instability (8 items); Emotional Dysregulation / Distorted Social Cognition (ED-DSC, 7 items); Dissociation / Trauma Symptoms (D-TS, 6 items); Food Maintenance (5 items); and Sexual Behaviour (5 items). The ACA-SF employs a three-point response scale (0–1–2), using a different set of descriptors in each of two parts. In Part 1 (21 items), less critical / higher incidence problems are measured as being '*not true*', '*partly true*' or '*mostly true*', in the last four to six months. In Part 2 (16 items), more critical / lower incidence problems are measured as '*did not occur*' (0 points), '*occurred once*' (1 point) or '*occurred more than once*' (2 points), in the last four to six months.

Adverse Interpersonal Experiences

Household dysfunction. The Spanish version of the Adverse Childhood Experiences International Questionnaire (ACE-IQ; World Health Organization, 2018) was used for the assessment of adversities related to household dysfunction. Group care workers reported about parent or caregiver substance use (i.e., "did the participating youth live with a household member who was a problem drinker or alcoholic, or misused street or prescription drugs?"); caregiver mental health problems (i.e., "did the participating youth live with a household member who was depressed, mentally ill or suicidal?"); caregiver incarceration (did the participating youth live with a household member who was ever sent to jail or prison?); and exposure to domestic violence (3 items; e.g. "did the participating youth see or hear a parent or household member in his/her home being yelled at, screamed at, sworn at, insulted or humiliated?"). Household problems related to substance use, mental health, and incarceration were reported using a no/yes format, whereas exposure to domestic violence items were rated using a four-point scale from 0 (*never*) to 3 (*often*). The exposure to domestic violence factor showed good internal consistency ($\alpha = .93$; $\omega = .94$).

Child maltreatment and neglect. Group care workers provided information about child maltreatment and neglect by means of the Child Maltreatment Severity questionnaire (MSQ; Calheiros et al., 2021). This scale was first translated into Spanish and then back-translated into English by an independent researcher. Differences were discussed with the members of the research team and then one of the participants' group care workers was asked about the suitability of the items in the Spanish context. The questionnaire is composed of 18 items to assess the severity of specific maltreatment subtype practices: physical and psychological maltreatment (4 items; e.g., "aggressive verbal interaction"); physical neglect (8 items; e.g., "physical hygiene and well-being"); and psychological neglect (6 items; e.g., "relationship with attachment figures"). Each

item is scored using four descriptors of severity and one response option in case of non-occurrence of the experience presented in the item. The response scale ranged from 1 (*unknown/none of the severity descriptions has occurred*) to 5 (*extremely severe*). Confirmatory factor analysis showed a good model fit for the original three inter-related factor's structure (χ^2 = 199.051, $p < .001$, df = 132, RMSEA = 0.058 [0.041, 0.074], CFI = 0.975, TLI = 0.971), as well as internal consistency (Cronbach's alpha between .78 and .85; McDonald's omega between .79 and .86)

External Criteria Variables

Mental health and Socioemotional skills

Adolescents self-reported on mental health problems using the dimension of behaviour problems included in the Spanish SSIS-RS (Gresham & Elliott, 2008). The subscales of internalizing (10 items; e.g., "I am afraid of many things") and externalizing problems (12 items; e.g., "I get into fights with others") were used in the current study. A composite score of total problems was created from the combination of externalizing and internalizing problems' subscales, showing good internal consistency (α = .89; ω = .89). Frequency of behaviour problems were assessed using a four-point rating scale which ranged from 0 (*never*) to 3 (*almost always*).

Participants self-reported their emotional skills using the dimension of social skills included in the SSIS-RS. This dimension consists of 46 items that provide information on several socioemotional competences: communication (6 items; e.g., "I say "please" when I ask for things"), cooperation (7 items; e.g., "I pay attention when others present their ideas"), assertion (7 items; e.g., "I ask for information when I need it"), empathy (6 items; e.g., "I feel bad when others are sad"), responsibility (7 items; e.g., "I am careful when I use things that are not mine"), compromise (7 items; e.g., "I participate in games"), and self-control (6 items; e.g., "I keep calm when others point

out my mistakes"). The items were rated using a four-point scale which ranged from 0 (*never*) to 3 (*almost always*). The SSIS-RS has demonstrating being a valid and reliable measure for both social skills and problem behaviours, showing high levels of internal consistency and validity (Gresham et al., 2011). The internal consistency of the total score in this sample was high (α = .92; ω = .91).

School engagement

Participants self-reported their school engagement through the adaptation of a scale developed by Wang and colleagues (2011). To adapt the scale to the Spanish context, the items were first translated into Spanish and then back-translated into English by an independent researcher. The final version of the Spanish items was discussed with one of the participants' group care workers in order to get an overview of their suitability with samples of adolescents in residential care. This measure is composed of 23 items assessing three school engagement dimensions: behavioural (7 items; e.g., "how often have you been sent to office?"), emotional (8 items; e.g., "I feel happy and safe in this school"), and cognitive (8 items; e.g., "how often do you try to figure out problems and planning how to solve them?"). The items corresponding to behavioural and cognitive dimensions were rated using a five-point scale from 1 (*almost never*) to 5 (*almost always*) whereas items from the cognitive engagement dimension were rated on a 5-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The composite score of school engagement was used in the current study, which showed high levels of internal consistency (α = .86; ω = .86).

Number of residential care placements

Group care workers reported on the total number of residential care facilities in which the adolescent was placed throughout their lifetime. They answered a single question about the total number of centres or group homes the adolescent had been in,

including the current one. Responses were provided on a five-point rating scale ranging from 1 (*one residential facility*) to 5 (*more than four residential facilities*). The frequencies are presented in Table 1.

Study procedure

This study was approved by the Ethics Review Committee of the Institute of Education and Child Studies at Leiden University (ECPW-2021/312), the Bioethics Committee at the University of Santiago de Compostela (USC-12/2021) and the Directorate of the Child Protection System in Galicia (Spain). Thirty-one residential care centres and child protection agencies were initially approached by phone and information letters were sent by mail, including the objectives and a brief explanation of the project methodology. In addition, group care workers were invited to participate in an online meeting to provide them with more detailed information about the project and to answer questions and resolve any doubts. After sending all the information, 24 residential facilities agreed to participate in the VRINEP project. A total of 340 children and youth were living in 22 of these facilities at the time they were invited to participate. Two residential facilities did not provide information on the total number of children and youth living there. Group care workers were asked to explain the project to adolescents and request their collaboration. To that end, a protocol was provided to group care workers, offering clear guidelines on how to present the project to young people and explain the implications of their participation. All adolescents in residential facilities were invited to participate, excluding those who did not speak Spanish or were challenged by intellectual disabilities that could hamper their understanding of their own situation in the residential facility. Participation was voluntary and only those group care workers and adolescents who voluntarily agreed to participate were included in the study. Among the 340 youngsters in the participating facilities, 71 did not meet

the inclusion criteria, 95 met the criteria but declined to participate, and 7 did not provide information. Active informed consent of the legal guardian(s) of adolescents younger than 14 years who agreed to participate was requested and given. In Spain, legal guardianship depends on the type of child protection measure. For court-mandated measures, the regional government assumes legal guardianship. For voluntary measures, parental rights remain with the birth family, who retain legal guardianship. Child Protection Delegations assisted us in obtaining informed consent for adolescents under their guardianship and in requesting consent from the legal guardians of children under their custody. Also, all adolescents provided informed assent to participate. Before completing the questionnaire, adolescents read a brief description of the project, including the type of information that was going to be collected. They could then decide whether to participate, understanding that a group care worker would be present to assist in case of questions or concerns while also respecting their privacy. Group care workers were responsible for ensuring that this process followed the guidelines. Data were collected through online questionnaires and confidentiality was ensured throughout the entire process. Two independent questionnaires were used for data collection: one to be reported by group care workers about the participating youth, and the other for adolescents to self-report. To minimize informant bias in the questionnaire responses, we requested that group care workers complete the questionnaires only for adolescents they knew well. Both questionnaires were securely linked using a hard password that was associated with the case file number of the participating adolescent. Two giveaways of five smartwatches each were held among all the adolescents that completed their questionnaires at T1 and T2.

Data analysis

The presumed six-factor model of the original ACA-SF scale was firstly modelled using a Confirmatory Factor Analysis (CFA). Subsequent Exploratory Factor Analyses (EFA) were conducted to find the best solution for the factorial structure of the Spanish ACA-SF. All models were estimated using Mplus 7 (Muthén & Muthén, 2012), using robust weighted least squares as estimator (WLSMV). Model fit was assessed using root-mean-square error of approximation (RMSEA), comparative fit index (CFI), and the Tucker-Lewis index (TLI). RMSEA values lower or equal to 0.06, and TLI and CFI values of 0.95 or higher were considered indicators of good model fit (Hu & Bentler, 1999). Internal consistency of ACA-SF subscales was examined through Cronbach's alpha and McDonald's omega and gender differences in all the study variables were examined using the *t*-test statistic. Validity was further investigated by analysing zero-order correlations between continuously distributed ACEs (i.e., exposure do domestic violence, physical/psychological maltreatment, physical neglect, and psychological neglect) and number of residential care placements with maltreatment-related symptoms and ACA-SF subscales. Additionally, *t*-tests were conducted to analyse differences in maltreatment-related symptoms and ACA-SF subscales with respect to dichotomous ACEs (i.e., caregivers' substance use, mental health problems, and incarceration). Convergent validity was tested by correlating ACA-SF factors with externalizing and internalizing problems, as well as with total behaviour problems. Concurrent validity was investigated by correlating ACA-SF with socioemotional skills, and school engagement. Two path analysis models were conducted to further support the distinctiveness of maltreatment-related mental health difficulties in adolescents who have been exposed to ACEs. The first path analysis model included early interpersonal experiences as exogenous variables, gender as a covariate, and the total ACA-SF score, externalizing, and internalizing problems as endogenous variables, whereas the second

model included ACA-SF factors as endogenous variables. Descriptive statistics, *t*-tests, and zero-order correlations were analysed using SPSS v.28 whilst path analysis models were analysed in Mplus 7.

Results

A CFA was conducted to analyse the model fit of the original six-factor ACA-SF. This model could not be computed due to convergence issues involving the factors of Sexual Behaviour and D-TS. Consequently, a series of EFAs ranging from one to six factors were performed to explore potential differences between the factor structure of the scale in this sample and the original structure of the ACA-SF. The model fit for the six EFA solutions is displayed in Table 2. The results indicated that the six-factor model obtained the best model fit. The factor structure of the original six-factor solution is presented in Supplementary Table S1. Whereas the present analysis identified very similar Non-Reciprocal Behaviour, D-TS, and Food Maintenance factors, some items on the Social Instability and ED-DSC sub-scales loaded on to different factors in the present analysis, including an expanded factor containing sexual behaviour and pseudomature items. Item 8 (i.e., "impulsive [acts rashly, without thinking]") loaded on the ED-DSC factor instead of the Social Instability factor. Item 17 (i.e., "startles easily") and item 23 (i.e., "can't get scary thoughts or images out of his/her head") loaded on D-TS factor instead of the ED-DSC factor. Finally, three items describing precocious, pseudomature behaviour loaded on the same factor as the sexual behaviour items, namely items 9 (i.e., "precocious"), 10 (i.e., "prefers to be with adults, rather than peers), and 11 (i.e., "prefers to mix with older youths"). Whereas the pre-adolescent ACC checklist includes a factor-derived 'pseudomature' scale, an equivalent pseudomature factor was not identified in the original ACA or ACA-SF factor analyses.

A second EFA was conducted, modelling solutions for up to seven factors, to examine whether these three 'pseudomature' items would form a separate factor in this sample of adolescents. The results of the model fit for the seven-factor model can also be found in Table 2. The seven-factor model outperformed previous models and was considered the best solution. The results of the seven-factor model, including factor loadings and factor structure, are shown in Table 3.

[Tables 2 and 3]

Descriptive statistics, internal consistency, and gender differences are presented in Table 4. Cronbach's alpha values for ACA-SF subscales ranged from 0.69 (i.e., Pseudomature Behaviour) to 0.84 (i.e., Food Maintenance) whereas McDonalds' omega ranged from 0.70 (i.e., Pseudomature Behaviour) to 0.84 (i.e., Food Maintenance). These values indicate that the internal consistency of the ACA-SF subscales ranged from acceptable to very good. Given the small number of participants identified as non-binary (n = 3), significant differences were analysed only between males and females. Significant differences between males and females were found in Social Instability, total behaviour problems, internalizing problems, and physical neglect. In all cases, females scored higher than males.

[Table 4]

Validity was further examined by comparing ACA-SF total and sub-scale score distributions of various risk exposure groups. Participants exposed to substance use in their household had significantly higher scores than non-exposed participants on the ACA-SF Total (t_{145} = -3.47, p < .001), Social Instability (t_{145} = -3.75, p < .001), ED-DSC Cognition (t_{144} = -4.12, p < .001), D-TS (t_{144} = -2.03, p < .05), and Sexual Behaviour (t_{123} = -2.68, p < .01) scales. Participants who lived with a household member with mental health problems had significantly higher scores on the ACA-SF

Total (t_{149} = -3.26, p < .001), ED-DSC (t_{149} = -3.34, p < .001), D-TS (t_{144} = -3.65, p < .001), and Sexual Behaviour (t_{137} = -2.51, p < .05) scales, compared to others; while participants who had lived in a household in which a family member was convicted or sent to jail had significantly higher scores on the ACA-SF Total (t_{148} = -2.65, p < .01), ED-DSC (t_{148} = -3.23, p < .01), and Sexual Behaviour (t_{38} = -2.14, p < .05) scores. Correlations between ACS-SF scores and continuously distributed risk exposure measures are listed in Table 5. The ACA-SF total score significantly correlated with all continuously measured interpersonal adversities and number of residential care placements. Conversely, the Non-Reciprocal Behaviour, Sexual Behaviour, and Pseudomature Behaviour scores were not significantly associated with any of these adversities. Differential significant correlations were found among the other ACA-SF factors and ACEs. Table 5 also lists correlations between ACA-SF scores and the self-reported SSIS-RS scores and school engagement. Again, the ACA-SF total score was significantly related to all the variables in the expected direction whereas Non-Reciprocal Behaviour and Pseudomature Behaviour did not show significant associations with any of these variables. Differential relationships were found among ACA-SF subscales and SSIS-RS scores and school engagement.

[Table 5]

Two path analysis models were conducted to further support the distinctiveness of maltreatment-related difficulties. Both models showed a perfect model fit as they were just identified (RMSEA = 0.00 [0.00, 0.00]; CFI = 1.00; TLI = 1.00; SRMR = 0.00). The first path analysis model included ACEs as exogenous variables, the total ACA-SF score, externalizing and internalizing problems as endogenous variables, and gender as a covariate. The results are displayed in Figure 1. Distinctive associations were found between ACEs and mental health after controlling for all the variables in the

model. Maltreatment-related symptoms showed significant associations with caregivers' substance use and physical and psychological maltreatment, whereas the presence of mental health issues in the household was significantly related to internalizing problems. The results of the path analysis model including ACA-SF subscales as endogenous variables are presented in Figure 2. The findings evidenced significant associations of caregivers' substance use with Social Instability and ED-DSC scores; physical / psychological maltreatment was significantly related to Non-Reciprocal Behaviour and D-TS scores; and the Pseudomature score was positively associated with psychological neglect and negatively associated with physical neglect. Caregivers' mental health issues were related to internalizing problems.

[Figure 1 and 2]

Discussion

Traditional mental health measures do not adequately assess the complex patterns of symptoms exhibited by adolescents who were exposed to early interpersonal adversities. The ACA-SF has been developed to evaluate a wide range of maltreatment-related symptoms observed among formerly maltreated young people placed in OOHC. This study aimed to provide empirical evidence of the psychometric properties of the ACA-SF in a sample of adolescents in residential OOHC. Overall, the ACA-SF showed good internal consistency, factorial validity, convergent validity, and concurrent validity, as demonstrated by Cronbach's alpha and McDonalds' omega coefficients, factor analyses, and associations between ACA-SF subscale scores with measures of prior risk exposure, concurrent general mental health difficulties and psychosocial correlates. The distinctiveness of maltreatment-related symptoms was further supported by the results showing significant associations with interpersonal adversities over and above other problematic behaviours, including internalizing and externalizing problems.

The analysis of gender differences indicated that boys and girls do not differ significantly in most maltreatment-related symptoms, except for social instability, a result that partially aligns with previous research (e.g., Collin-Vézina et al., 2011).

Contrary to expectations, the factor structure of the present sample's ACA-SF scores differs somewhat from the original factor structure found amongst scores for adolescents in family-based OOHC. This finding may be due to the characteristics of the sample. Most studies to date using ACA in any of its forms have been conducted with adopted or foster care samples (Gatfield & Ho, 2017; Goemans et al., 2018; Tarren-Sweeney, 2007, 2013). None of the studies employing this measure with samples of adolescents in residential care have tested its factor structure (Norrish et al., 2019; Peh et al., 2022). According to the review of Leloux-Opmeer et al. (2016), the profiles of adolescents highly differ depending on the characteristics of the OOHC placement, which supports the different factor structure observed in this sample, even though the newly identified factor did not show significant associations with external criteria It is possible, for example, that pseudomature behaviours in young people in residential care may not necessarily reflect aberrant attachment development, but may instead serve an adaptive function. For instance, associating with older youth and appearing more grown up might benefit adolescents in navigating the residential care environment. These behaviours could potentially mitigate the risk of bullying and provide social opportunities. Similarly, emotional restraint and withdrawal, which characterize 'non-reciprocal behaviour,' may serve an adaptive function in residential settings by protecting youth from potential interpersonal breakdowns. This could also help explain the lack of significant differences observed between Non-reciprocal and Pseudomature behaviours in relation to external criteria.

The role of interpersonal adversities and number of residential placements in relation to maltreatment-related symptoms was evaluated to further support the validity of the ACA-SF. The ACA-SF total score of maltreatment-related symptoms was associated with all the interpersonal adversities as well as with the number of residential care placements, even after incorporating other mental health outcomes in the model, endorsing the distinctiveness of maltreatment-related symptomatology. However, some mental health difficulties are much more strongly associated with early adversity exposure than others. Adolescents exposed to household dysfunction (i.e., caregivers' substance use, mental health, and incarceration) present more symptoms of emotional dysregulation and inappropriate sexual behaviour; whereas adolescents exposed to domestic violence and child maltreatment show more social instability, emotional dysregulation, dissociation, trauma symptoms, and food maintenance behaviours. These results partially align with previous research that found a wider range of mental health developmental outcomes in adolescents who were maltreated or exposed to domestic violence compared to those who were exposed to other forms of household dysfunction (Narayan et al., 2017; Negriff, 2020). However, when looking at the model including all interpersonal adversities, our results show that both household dysfunction and child maltreatment predict maltreatment-related symptoms over and above the other ACEs. Hence, adversities related to household dysfunction, especially household substance use and mental health, must be considered in mental health assessment procedures (Felitti et al., 2019; Tan & Mao, 2023).

Adolescents who were placed in a larger number of residential facilities also present higher levels of social instability and emotional dysregulation, aligning with previous studies that found higher rates of placement instability in children with clinical trauma symptoms (Clark et al., 2020). This result is not surprising as placement

instability impacts the capacity of adolescents to form trusting relationships with others which limits their development of social skills for interacting with peers and staff (Patterson et al., 2018). Frequent placement changes lead adolescents to develop a protective emotional barrier and may evoke aggressive reactions due to the mistrust of others and the difficulties they face in interpreting social cues and manage emotions (Bloom et al., 2021).

The current results also support the convergent and concurrent validity of the ACA-SF, as evidenced by its correlations with measures of externalizing and internalizing problems and other external criteria, including socioemotional skills and school engagement. The ACA-SF total score showed significant associations in the expected direction with all the assessed external criteria, supporting the validity of the scale to detect developmental mental health outcomes. Regarding ACA-SF subscales, our results slightly differ from those found in the only study which analysed the convergent validity of the ACA-SF in a sample of adolescents in residential care (Eadie et al., 2020). Eadie et al. (2020) found significant correlations only between Food Maintenance and Sexual Behaviours with externalizing problems using the SDQ. These authors suggested that the ACA-SF may be better capturing internalizing symptoms. In our study, however, the ACA-SF subscales were more strongly related to externalizing problems with only two significant correlations observed for internalizing problems (i.e., D-TS and Sexual Behaviour). To interpret these results, differences in residential care systems between countries should also be considered. The study by Eadie et al. (2020) was conducted in Australia, and although there are commonalities with the Spanish system, there are also differences that might impact adolescents' development. For instance, in Australia, residential care is primarily used for adolescents with severe and complex profiles, often those who have experienced previous breakdowns in foster

care placements. Furthermore, a ratio of three or four youngsters per two staff members is commonly observed in the Australian system, where residential facilities may still rely on group care workers lacking professional or social work qualifications (McNamara & Wall, 2023). In Spain, however, residential care is not reserved solely for young people with severe problems. Group care workers are highly qualified, although the number of youngsters in a residential facility is higher, ranging from eight to more than 30 (Bravo et al., 2023). These differences could impact the individualization of programs and, consequently, the mental health outcomes observed in this population.

Our findings also suggest that maltreatment-related symptoms are distinct from those reported on traditional internalizing and externalizing measures. Thus, assessment procedures with adolescents in residential care should involve standardized measures for the evaluation of internalizing and externalizing problems (Rodrigues et al., 2019). These assessments should be complemented with additional measures, such as the ACA-SF, to comprehensively capture the complex range of maltreatment-related symptoms observed in this population (Tarren-Sweeney, 2013).

Theoretical and Practical Implications

Examining the symptomatology observed in young people who have been exposed to ACEs and who have to cope with the placement in a residential facility is crucial for shifting towards trauma-informed models of care (Westlake, 2023; Whitt-Woosley, 2020). Until now, limited research has been conducted to analyse the complexity of the symptomatology observed in this population beyond traditional diagnostic categories, such as Post-Traumatic Stress Disorder (PTSD) (D'Andrea et al., 2012). Furthermore, this complexity presents methodological challenges, requiring the development of tools that adequately conceptualize and measure the full array of symptoms (Dickes et al., 2018; Tarren-Sweeney, 2014). The current findings contribute

not only to understanding a more complete array of maltreatment-related symptoms and their relationship with ACEs, but also empirically support the use of the ACA-SF as a reliable and valid standardized measure for their evaluation. Among the measures specifically designed to evaluate trauma or maltreatment-related symptoms beyond PTSD criteria, the ACA and its shorter variants (ACA-SF and BAC-A) are strongly recommended for their use with children and adolescents in OOHC (Denton et al., 2017). This measure captures maltreatment-related symptomatology that is not adequately measured by other tools, doing so from a developmental perspective (Milne & Collin-Vézina, 2015).By providing evidence of the psychometric properties of the ACA-SF for use with adolescents in residential care, we contribute to enhancing assessment procedures in this context (Collin-Vézina et al., 2011). This improvement could support increased engagement in evidence-supported trauma treatment, and hopefully helps in reducing placement instability and promoting adolescents' wellbeing (Clark et al., 2020; Kagan et al., 2023).

Limitations and Future Directions

The present study results might be influenced by the sample size and characteristics of the study population. While the collected data are valuable, especially given the difficulty in reaching this population (Costa et al., 2022), the sample size is relatively small, preventing us from conducting more robust analyses, such as measurement invariance. Therefore, future studies should aim for larger samples to investigate whether the factor structure of the ACA-SF remains invariant across genders. Moreover, given that CFA could not be conducted in the current study, we encourage future research to further analyse the ACA-SF's factor structure using CFA to determine if it can be replicated in other samples of young people in residential OOHC. The sample of study comprised only adolescents in residential care, which

might limit the comparability with previous studies. Future research must include larger samples encompassing adolescents in various OOHC placements to analyse potential differences in maltreatment-related symptoms and in the ACA-SF structure. Finally, the use of several informants in our study may have influenced the results. In this study, group care workers reported on interpersonal experiences and maltreatment-related symptoms, whereas adolescents reported on other developmental mental health outcomes and external criteria, potentially influencing the validity of the ACA-SF. Thus, the use of a more integrated approach, assessing all variables from multiple informants must be contemplated in future studies.

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Table 1. Characteristics of the Sample

	Categories	Boys (n = 79)		Girls (n = 78)		Non-binary (n = 3)
		N (%)	n missing (%)	*N* (%)	n missing (%)	*N* (%)
Type of residential facility	Family group homes	19 (24.1%)	1 (1.3%)	30 (38.5%)	3 (3.3%)	-
	Small residential care centres	12 (15.2%)		15 (19.2%)		-
	Centres with independent units	38 (48.1%)		26 (33.3%)		1 (33.3%)
	Therapeutic residential care	8 (10.1%)		4 (5.1%)		2 (66.7%)
	Other	1 (1.3%)		-		-
Legal framework	Mandated	52 (65.8%)	2 (2.5%)	46 (59%)	4 (5.1%)	1 (33.3%)
	Voluntary	25 (31.6%)		28 (35.9%)		2 (66.7%)
Main cause for the CPS measure	Abandonment/neglect	15 (19.2%)	2 (2.5%)	26 (33.3%)	6 (7.7%)	-
	Behaviour problems	16 (20.3%)		10 (12.8%)		-
	Failure to fulfil parental duties	14 (17.7%)		6 (7.7%)		1 (33.3%)
	Physical abuse	6 (7.6%)		8 (10.3%)		1 (33.3%)
	Psychological abuse	3 (3.8%)		3 (3.8%)		1 (33.3%)
	Prostitution, mendicity, delinq.	1 (1.3%)		-		-
	Other	22 (27.8%)		19 (24.4%)		-
Case plan	Family reunification	39 (49.4%)	2 (2.5%)	42 (53.8%)	7 (9%)	2 (66.7%)
	Foster care/adoption	8 (10.1%)		13 (16.7%)		-
	Independent life	30 (38.0%)		16 (20.5%)		1 (33.3%)
Length in the current facility	Less than one month	-	2 (2.5%)	2 (2.6%)	4 (5.1%)	-
	1-6 months	13 (16.5%)		13 (16.7%)		1 (33.3%)
	6-12 months	21 (26.6%)		20 (25.6%)		2 (66.7%)
	12-24 months	17 (21.5%)		15 (19.2%)		-
	More than 24 months	26 (32.9%)		24 (30.8%)		-
Total number of residential centres	One	36 (45.6%)	14 (17.7%)	30 (38.5%)	28 (35.9%)	-
	Two	22 (27.8%)		12 (15.4%)		2 (66.7%)
	Three	4 (5.1%)		5 (6.4%)		1 (33.3%)
	Four	2 (2.5%)		1 (1.3%)		
	More than four	1 (1.3%)		2 (2.6%)		-
Current placement of the siblings	Separated	47 (59.5%)	8 (10.1%)	46 (59%)	14 (17.9%)	1 (33.3%)
	At least one in the same centre	14 (17.7%)		7 (9%)		2 (66.7%)
	All together	10 (12.7%)		11 (14.1%)		-
Contact with biological father	No	38 (48.1%)	5 (6.3%)	35 (44.9%)	5 (6.4%)	1 (33.3%)
	Yes	36 (45.6%)		38 (48.7%)		2 (66.7%)
Contact with biological mother	No	19 (24.1%)	3 (3.8%)	23 (29.5%)	6 (7.7%)	-
	Yes	57 (72.1%)		49 (62.8%)		3 (100%)
SES	Low	43 (54.4%)	3 (3.8%)	28 (35.9%)	6 (7.7%)	1 (33.3%)
	Middle-low	19 (24.1%)		26 (33.3%)		1 (33.3%)
	Middle	9 (11.4%)		13 (16.7%)		1 (33.3%)
	Middle-high	3 (3.8%)		3 (3.8%)		-
	High	2 (2.5%)		2 (2.6%)		-

Table 2. Model Fit Indices of the Exploratory Factor Analysis Models from One to Seven Factors

Model	Chi-square	RMSEA	CFI	TLI	SRMR
One-factor	1557.923***	0.096 [0.090, 0.102]	0.653	0.633	0.231
Two-factor	1118.469***	0.074 [0.068, 0.081]	0.804	0.780	0.187
Three-factor	849.587***	0.057 [0.049, 0.065]	0.891	0.870	0.139
Four-factor	721.593***	0.049 [0.040, 0.057]	0.926	0.906	0.108
Five-factor	631.322***	0.042 [0.032, 0.052]	0.948	0.929	0.096
Six-factor	538.691***	0.033 [0.019, 0.044]	0.970	0.957	0.084
Seven-factor	**457.141*** **	**0.021 [0.000, 0.035]**	**0.989**	**0.983**	**0.069**

Table 3. Factor Structure of the Seven-factor Model Including all the Items of the Original ACA-Short Form

Item	Factor						
	1	2	3	4	5	6	7
I. Non-Reciprocal							
2. does not show affection	0.008	**0.550**	0.091	0.018	-0.367	-0.073	0.051
6. hides feelings	0.169	**0.835**	0.024	0.128	-0.022	-0.204	0.107
12. refuses to talk	0.126	**0.770**	0.100	0.001	0.048	0.016	0.085
14. resists being comforted when hurt	0.148	**0.744**	0.396	0.127	-0.017	0.062	-0.101
16. seems alone in the world	0.178	**0.650**	-0.158	0.381	-0.016	-0.026	0.247
21. withdrawn	0.090	**0.926**	-0.202	0.058	-0.047	-0.241	-0.117
II. Social Instability							
1. craves affection	0.099	-0.250	-0.015	0.262	**0.623**	0.257	0.272
13. relates to strangers as if they were family	0.092	0.021	0.086	-0.069	**0.822**	0.432	0.409
19. too friendly with strangers	0.189	-0.055	0.231	0.071	**0.757**	0.377	0.331
20. tries too hard to please other young people	-0.042	0.003	0.126	0.204	**0.820**	0.434	0.115
III. Emotional Dysregulation/Distorted Social Cognition							
8. impulsive (acts rashly, without thinking)	0.349	-0.007	0.243	0.187	0.265	**0.883**	0.210
15. says friends are against him/her	0.424	0.014	-0.105	0.302	0.392	**0.483**	0.088
32. intense reaction to criticism	0.271	0.177	0.028	0.333	0.394	**0.596**	0.230
33. says his/her life is not worth living	0.119	0.274	0.183	0.400	0.337	**0.606**	0.215
37. uncontrollable rage	0.413	-0.021	0.175	0.267	0.276	**0.799**	-0.051
IV. Dissociation/Trauma Symptoms							
17. startles easily (‘jumpy’)	0.168	0.242	0.120	**0.575**	0.277	0.211	-0.195
22. appears dazed, ‘spaced out’	0.172	0.332	-0.136	**0.651**	0.347	0.091	-0.046
23. can’t get scary thoughts or images out of his/her head	0.090	0.197	0.167	**0.717**	0.284	0.214	0.079
24. can’t tell if an experience is real	0.293	0.008	0.232	**0.851**	0.241	0.345	-0.015
25. extreme reaction to losing a friend	0.145	0.022	0.056	**0.599**	0.344	0.560	0.147
26. feels like things, people or events aren’t real	0.479	0.016	0.362	**0.896**	0.279	0.480	0.092
28. has panic attacks	0.024	0.162	0.185	**0.823**	0.180	0.029	0.077
29. has periods of amnesia	0.215	0.322	0.234	**0.752**	0.052	0.140	0.230
30. hits head, head-banging	0.216	0.039	0.133	**0.825**	0.183	0.405	0.322
V. Food Maintenance							
3. eats secretly	**0.803**	0.199	-0.157	0.032	0.107	0.231	0.414
4. eats too much	**0.849**	0.178	-0.083	0.215	0.313	0.066	0.099
5. gorges food	**0.932**	0.175	-0.058	0.239	0.328	0.035	0.100
7. hides or stores food	**0.878**	0.308	-0.114	-0.067	-0.082	0.241	0.472
18. steals food	**0.774**	0.049	0.004	0.178	0.165	0.387	0.361
VI. Sexual Behaviour							
27. forces or pressures other youth or children into sexual acts	0.160	-0.036	0.183	-0.106	0.380	0.446	**0.781**
31. inappropriately shows genitals to others	0.334	0.197	0.261	0.541	0.269	0.288	**0.748**
34. seems overly preoccupied with sex	0.394	0.045	0.230	0.165	0.251	0.618	**0.693**
35. sexual behaviour not appropriate for age	0.071	0.046	0.250	0.119	0.405	0.237	**0.811**
36. tries to involve others in sexual behaviour	0.125	0.139	0.206	0.177	0.376	0.285	**0.997**
VII. Pseudomature Behaviour							
9. precocious (talks or behaves like an adult)	-0.076	0.144	**0.646**	0.133	-0.021	-0.016	0.112
10. prefers to be with adults, rather than peers	-0.102	0.219	**0.801**	0.221	0.181	0.068	0.201
11. prefers to mix with older youths	-0.106	0.025	**0.758**	0.277	0.342	0.221	0.175

Table 4. Descriptive Statistics, Internal Consistency, and Gender Differences in all the Study Variables

	Cronbach's alpha	McDonald's omega	Range	Total sample M (SD)	Males M (SD)	Females M (SD)	Non-binary M (SD)	*t*
ACA-SF								
ACA-SF total score	.84	.83	0-1.16	0.46 (0.25)	0.43 (0.24)	0.48 (0.25)	0.71 (0.41)	-1.18
Non-Reciprocal Behaviour	.81	.81	0-2	0.66 (0.51)	0.70 (0.51)	0.61 (0.52)	0.94 (0.51)	1.14
Social Instability	.75	.76	0-2	0.70 (0.52)	0.57 (0.43)	0.83 (0.58)	0.75 (0.25)	-3.08***
Emotional Dysregulation	.73	.75	0-2	0.68 (0.53)	0.69 (0.50)	0.66 (0.55)	1.00 (0.69)	0.37
Dissociation/Trauma Symptoms	.80	.80	0-2	0.28 (0.37)	0.26 (0.32)	0.29 (0.40)	0.68 (0.67)	-0.48
Food Maintenance	.84	.84	0-2	0.38 (0.51)	0.33 (0.48)	0.43 (0.55)	0.47 (0.31)	-1.26
Sexual Behaviour	.76	.77	0-1.80	0.15 (0.34)	0.12 (0.30)	0.17 (0.36)	0.47 (0.50)	-1.01
Pseudomature Behaviour	.69	.70	0-2	0.57 (0.56)	0.50 (0.55)	0.65 (0.58)	0.67 (0.00)	-1.63
External criteria								
Total problems	.89	.89	0.18-2.67	1.33 (0.53)	1.19 (0.48)	1.45 (0.52)	1.80 (0.96)	-2.96**
Externalizing	.87	.87	0.08-2.92	1.22 (0.58)	1.21 (0.55)	1.22 (0.58)	1.28 (1.35)	-0.14
Internalizing	.86	.87	0.10-3.10	1.45 (0.68)	1.16 (0.53)	1.72 (0.67)	2.42 (0.76)	-5.12***
Socioemotional skills	.92	.91	0.93-2.98	2.07 (0.37)	2.09 (0.38)	2.05 (0.37)	2.24 (0.36)	0.46
School engagement	.86	.86	1.96-4.87	3.45 (0.63)	3.53 (0.57)	3.37 (0.69)	3.28 (0.42)	1.46
Residential care placements	-	-	1-5	1.65 (0.93)	1.62 (0.86)	1.66 (1.02)	2.33 (0.58)	-0.25
ACEs								
Substance use in the household	-	-	0-1	0.56 (0.50)	0.60 (0.49)	0.54 (0.50)	0.33 (0.58)	0.72
Mental health in the household	-	-	0-1	0.57 (0.50)	0.55 (0.50)	0.58 (0.50)	1.00 (0.00)	-0.35
Criminality in the household	-	-	0-1	0.23 (0.42)	0.27 (0.45)	0.18 (0.38)	0.33 (0.58)	1.55
Exposure to domestic violence	.93	.94	0-3	1.23 (1.15)	1.36 (1.19)	1.11 (1.13)	1.33 (0.58)	1.30
Physical/psychological maltreatment	.85	.84	1-4.25	1.52 (0.78)	1.48 (0.74)	1.54 (0.81)	1.75 (1.09)	-0.49
Physical neglect	.85	.86	1-4	1.51 (0.69)	1.45 (0.64)	1.59 (0.74)	1.33 (0.38)	-1.23
Psychological neglect	.78	.79	1-4.33	1.81 (0.78)	1.67 (0.73)	1.95 (0.83)	1.76 (0.21)	-2.16*

Note. Due to the small number of participants identified as non-binary ($n = 3$), *t*-test were used to analyse significant differences between males and females.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 5. Zero-order Correlations Between ACA-SF Scores and Risk Exposure and Concurrent Mental Health Scores

	ACA-SF total score	Non-Reciprocal Behaviour	Social Instability	ED-DSC	D-TS	Food Maintenance	Sexual Behaviour	Pseudomature Behaviour
ACE-IQ Exposure to domestic violence score	.29***	.08	.23**	.27**	.30***	.06	.10	-.03
MSQ Physical/psychological maltreatment score	.32***	.13	.19*	.23**	.36***	.12	.04	.03
MSQ Physical neglect score	.20*	.05	.06	.13	.25**	.24**	.11	-.08
MSQ Psychological neglect score	.30***	.05	.18*	.21*	.32***	.23**	.11	.08
Number residential care centres	.21*	.12	.20*	.20*	.10	.09	.07	.01
SSIS-RS Total behaviour problems score	.34***	.12	.16	.27**	.26**	.23**	.27**	-.02
SSIS-RS Externalizing problems score	.37***	.07	.17	.37***	.24**	.27**	.24**	-.07
SSIS-RS Internalizing problems score	.20**	.12	.11	.08	.21*	.09	.21*	.05
SSIS-RS Socioemotional skills total score	-.33***	-.14	-.15	-.36***	-.19*	-.06	-.16	.07
School engagement score	-.38***	-.12	-.27**	-.36***	-.15	-.12	-.34***	.02

Note. ED-DSC = Emotional Dysregulation / Distorted Social Cognition; D-TS = Dissociation / Trauma Symptoms.
* $p < .05$; ** $p < .01$; *** $p < .001$.

Supplementary Table S1

The items are grouped according to the original structure	Factor					
	1	2	3	4	5	6
I. Non-Reciprocal						
2. does not show affection	-0.014	**0.546**	0.025	-0.036	-0.026	0.026
6. hides feelings	0.176	**0.831**	0.192	-0.053	-0.143	0.114
12. refuses to talk	0.084	**0.774**	0.046	0.036	0.031	0.125
14. resists being comforted when hurt	-0.093	**0.756**	0.169	-0.107	0.122	0.151
16. seems alone in the world	0.160	**0.632**	0.400	0.010	0.037	0.098
21. withdrawn	0.122	**0.906**	0.126	-0.035	-0.227	-0.179
II. Social Instability						
1. craves affection	0.062	-0.243	0.259	**0.618**	0.218	0.231
8. impulsive (acts rashly, without thinking)	-0.010	0.027	0.142	0.325	**0.882**	0.253
9. precocious (talks or behaves like an adult)	-0.251	0.161	0.130	-0.179	0.068	**0.417**
10. prefers to be with adults, rather than peers	-0.344	0.277	0.218	-0.018	0.160	**0.550**
11. prefers to mix with older youths	-0.390	0.092	0.245	0.159	0.282	**0.512**
13. relates to strangers as if they were family	0.114	0.032	-0.071	**0.849**	0.343	0.380
19. too friendly with strangers	0.102	-0.026	0.089	**0.724**	0.345	0.421
20. tries too hard to please other young people	-0.200	0.022	0.176	**0.803**	0.358	0.145
III. Emotional Dysregulation/Distorted Social Cognition						
15. says friends are against him/her	0.196	0.033	0.304	0.435	**0.503**	0.049
17. startles easily (‘jumpy’)	-0.188	0.269	**0.566**	0.202	0.277	-0.073
23. can’t get scary thoughts or images out of his/her head	-0.201	0.217	**0.701**	0.215	0.278	0.117
25. extreme reaction to losing a friend	-0.160	0.044	0.548	0.365	**0.561**	0.100
32. intense reaction to criticism	0.035	0.192	0.311	0.440	**0.581**	0.166
33. says his/her life is not worth living	-0.154	0.290	0.367	0.361	**0.587**	0.205
37. uncontrollable rage	-0.024	0.018	0.240	0.309	**0.802**	0.054
IV. Dissociation/Trauma Symptoms						
22. appears dazed, ‘spaced out’	-0.041	0.338	**0.666**	0.318	0.133	-0.093
24. can’t tell if an experience is real	-0.164	0.047	**0.835**	0.142	0.473	0.107
26. feels like things, people or events aren’t real	-0.066	0.073	**0.877**	0.168	0.635	0.268
28. has panic attacks	-0.231	0.179	**0.809**	0.080	0.122	0.127
29. has periods of amnesia	-0.042	0.346	**0.766**	-0.017	0.242	0.284
30. hits head, head-banging	-0.051	0.062	**0.812**	0.179	0.449	0.300
V. Food Maintenance						
3. eats secretly	**0.777**	0.224	0.081	0.146	0.374	0.356
4. eats too much	**0.784**	0.196	0.380	0.293	0.141	0.271
5. gorges food	**0.851**	0.199	0.409	0.304	0.141	0.279
7. hides or stores food	**0.864**	0.335	-0.015	-0.029	0.410	0.418
18. steals food	**0.612**	0.084	0.211	0.184	0.526	0.374
VI. Sexual Behaviour						
27. forces or pressures other youth or children into sexual acts	0.295	-0.025	-0.123	0.442	0.405	**0.732**
31. inappropriately shows genitals to others	0.264	0.225	0.545	0.240	0.382	**0.767**
34. seems overly preoccupied with sex	0.292	0.071	0.149	0.298	0.653	**0.670**
35. sexual behaviour not appropriate for age	0.213	0.056	0.098	0.395	0.250	**0.788**
36. tries to involve others in sexual behaviour	0.314	0.138	0.161	0.397	0.301	**0.957**