Received: 22 September 2025 | Revised: 11 February 2026 | Accepted: 11 February 2026

DOI: 10.1002/jts.70062

ISTSS International Society for Traumatic Stress Studies

WILEY

RESEARCH ARTICLE

Psychometric considerations of Adverse Childhood Experiences Questionnaire: Structure, validity, and the development of a supplementary instrument

Borna Loncar[1] | **Robert Fox**[2] | **Nadja Heym**[1] | **Alexander Sumich**[1]

[1]Department of Psychology, Nottingham Trent University, Nottingham, UK

[2]Department of Psychology, National College of Ireland, Dublin, Ireland

Correspondence
Borna Loncar, Department of Psychology, Nottingham Trent University, 50 Shakespeare St, Nottingham, NG1 4FQ, United Kingdom. Email: borna.loncar@ntu.ac.uk

Funding information
Fundação Bial, Grant/Award Number: 092/2022

Abstract

Adverse childhood experiences (ACEs) are linked to numerous negative physical and mental health outcomes. The current study addressed theoretical, conceptual, and measurement problems by evaluating a novel extension to the seminal ACEs questionnaire (ACEs-Q). Two U.K.-based adult samples ($N_{\text{Study 1}} = 859$, $N_{\text{Study 2}} = 297$) were used to examine the structure of the ACEs-Q via principal component analysis (PCA) and, within a structural equation modeling (SEM) framework, reflective and composite–formative models, as well as to develop and validate a supplementary measure—the ACEs-Related Impairment Questionnaire (ACEs-RIQ)—designed to assess the impairment associated with ACEs. In Study 1, PCA supported a two-factor ACEs-Q structure encompassing Childhood Maltreatment (CM) and Household Challenges (HC) factors. Both SEM approaches showed similar associations with internalizing outcomes, primarily driven by CM, composite–formative: $\beta_{\text{Depression}} = .50$, $\beta_{\text{Anxiety}} = .43$, $\beta_{\text{Stress}} = .42$; reflective: $\beta_{\text{Depression}} = .51$, $\beta_{\text{Anxiety}} = .43$, $\beta_{\text{Stress}} = .42$. Although the findings indicate compatibility of the ACEs construct with both modeling approaches, the composite–formative model, where dichotomous items function as contributing indicators that form rather than reflect the construct, is more closely aligned with the current conceptualization of ACEs. In Study 2, the ACEs-RIQ demonstrated high internal consistency, Cronbach's $\alpha = .92$, and predictive validity comparable to the ACEs-Q, tested through SEM. The ACEs-RIQ was found to be a valid, reliable instrument that extends the ACEs-Q by capturing impairment due to adversity rather than exposure alone.

The high overall prevalence of adverse childhood experiences (ACEs) has been raised as a global health concern due to the profound effects ACEs can have on children's health and development (SmithBattle et al., 2022). ACEs, defined as potentially traumatic events that occur before 18 years of age, have been consistently linked to a wide range of immediate and later-life psychopathologies, including poor physical and mental health outcomes (Felitti et al., 1998; Gilbert et al., 2015). One of the most commonly used instruments to assess ACEs is the Adverse Childhood

Experiences Questionnaire (ACEs-Q; Felitti et al., 1998). Its second revised version (Anda et al., 1999; Dong et al., 2004) assesses exposure to 10 experiences categorized into two domains: childhood maltreatment (CM) and household challenges (HC; Choi et al., 2020; Mersky et al., 2017).

The widespeard use of ACEs assessments has brought to light significant conceptual, theoretical, and methodological issues. Conceptual issues around defining the construct of ACEs have been previously exspressed (McLaughlin,2016), with an increaisng number of ACEs-Q derivatives (Mersky et al., 2017) reflecting a lack of definitional and operational concensus. Despite significant implications for policy and practice, over one quarter of a century since its initial development, these issues have remained underexplored, particularly for the second ACEs-Q revision. In this article, we present two studies to address them. In the first study, we used principal component analysis (PCA) to examine the structure of the 10-item second revised version of the ACEs-Q and structural equation modeling (SEM) to compare the predictive validity of the to reflective and composite–formative models. In the second study, we developed and validated the ACEs-Related Impairment Questionnaire (ACEs-RIQ), a supplementary measure designed to assess ACEs-related impairment.

Study 1 overview

The ACEs-Q has been criticized for combining items from multiple instruments without sufficient evaluation of the measure's validity, reliability, and factor structure, thus restricting its utility in clinical practice (Holden et al., 2020; McLennan et al., 2020). One of the central debates in this context revolves around the conceptualization and measurement of ACEs; that is, whether they should be understood through a reflective or formative measurement framework. Research has traditionally treated ACEs as a reflective construct, assuming that adverse experiences are manifestations of an underlying latent trait. However, ACEs are better understood as a set of indicators that define the construct, wherein the experiences themselves give rise to adversity, aligning more closely with a *composite–formative model*. A detailed outline of these frameworks is presented in the Supplementary Materials.

To date, most studies have examined the structure of ACEs instruments using reflective modeling techniques (e.g., exploratory factor analysis [EFA], confirmatory factor analysis [CFA]). Empirical support has been reported for one- (Bethell et al., 2017), two- (Brumley et al., 2019; Meinck et al., 2017), and three-factor models (Scott et al., 2013), with variation largely reflecting differences in questionnaire properties. Few studies have directly examined the 10-item, second revision of the ACEs-Q, though similar versions have shown a two-factor structure comprising CM and HC. Predictive validity has been consistently supported through dose-dependent associations between ACEs and psychopathology across both reflective (Mersky et al., 2017) and formative approaches (Bethell et al., 2017).

The structure of ACEs has also been examined using approaches consistent with formative modeling (e.g., PCA), though findings remain inconsistent. Brown et al. (2013) identified three components in an 11-item version; Gette et al. (2022) found two components in a 13-item ACEs-IQ and six components in a 31-item version; and Kidman et al. (2019) identified three components in a 13-item version examined in a sample of Malawian adolescents. However, these instruments differ substantially from the 10-item ACEs-Q, limiting comparability. Among versions most closely resembling the ACEs-Q, a two-factor structure comprising CM and HC has been supported (Choi et al., 2020; Mersky et al., 2017), though the use of reflective modeling in these studies increases the risk of measurement error (MacKenzie et al., 2005).

Collective findings and face-value inspections of subscales suggest that CM and HC represent conceptually distinct constructs. As composite–formative models accommodate heterogeneity within the constructs, we tested the structure and validity of the ACEs-Q, as well as the CM and HC factors, using a composite–formative approach. Reflective modeling of the instrument was also employed to enable within-study comparisons between the two frameworks and facilitate alignment with previous ACEs-Q research, which has predominantly relied on reflective methods. However, it should be noted that from a theoretical standpoint, ACEs inherently constitute a formative construct.

Study 2 overview

The dose–response associations between ACEs and negative mental health outcomes have been well-established across various assessments and contexts (Felitti et al., 1998; Gilbert et al., 2015). However, the measurement approaches and psychometric properties of ACEs assessments significantly affect their outcomes, highlighting the need for careful consideration in their selection and application. ACEs are typically measured using checklists rated in a dichotomous or ordinal response format. Whereas ordinal ratings capture nuances in adversity, such as intensity, duration, and chronicity, which influence outcomes (Litrownik et al., 2005), dichotomous formats fail to reflect these dimensions. When summed scores are compared, explained variance is 2–5 times higher when ACEs are assessed using ordinal rather than dichotomous ratings (Reidy et al., 2021). Thus, in its original form of

solely assessing any exposure categorically, ACEs-Q is limited in its ability to provide nuanced data.

Trauma theory integration

A lack of psychometric validation of ACEs instruments and their associated critiques (McLennan et al., 2020) may, in part, reflect the complexity of measuring ACEs in practice. Although ACEs cannot be equated to trauma, the trauma literature can inform factors relevant to ACEs measurement. For instance, characteristics of trauma exposure, including frequency, severity, duration, and exposure type, are considered outcome determinants (Frans et al., 2005; Litrownik et al., 2005). Additionally, sociodemographic factors such as sex, age, and age of onset can further inform the impact of ACEs (Perkonigg et al., 2000). Developing a measure or statistical procedure that comprehensively accounts for the main factors influencing outcomes is challenging due to the large number of variables involved and the complexity of their interplay.

First, ACEs measurement is strained by the inconsistent operationalization of exposure and outcome severity. Findings regarding the ranking of exposure types according to outcome severity have demonstrated that different ACE types exhibit unique underlying mechanisms and predict different outcomes to varying degrees (Reidy et al., 2021). Even though most ACEs-Q items represent negative experiences, it is not always appropriate to assume their negative impact. In addition, exposure to multiple trauma types has been associated with considerably poorer mental health outcomes compared to a single exposure or multiple exposures to the same type of event, each combination of experiences resulting in unique outcomes (Schilling et al., 2008).

Given the inconsistencies in the literature, likely driven by methodological and sample differences, it may be more effective to measure the effect of exposure alongside exposure alone to gain a clearer understanding of the subjective severity of individual experiences. The impairment associated with ACEs, viewed as an index of an individual's vulnerability, can account for a variety of contextual factors that may not be directly measured. Similarly, both the past psychological distress experienced at the time of the event and event-related distress at present may further inform trajectories of impact and outcome severity. Psychological distress is commonly operationalized as one's psychopathological reactions to an experience, often measured via internalizing and externalizing assessments. Distress can also be viewed as a state of negative arousal triggered by a stimulus (Matthews, 2016), which, alongside the aforementioned factors and through biopsychosocial mechanisms, results in psychopathology that subsequently determines functional impairment. Therefore, distress is, in this context, considered a psychopathological predictor rather than an outcome (Hashoul-Andary et al., 2016). In addition, a relative instability of impact and distress levels over time (Pat-Horenczyk et al., 2017) suggests that the temporal distance from the adverse event(s) should also be considered.

As demonstrated, Study 1 findings highlight the importance of clearly defining the ACEs construct and the implications of this definition for the scale structure, item selection, measurement, and predictive accuracy. Drawing on insights from the trauma literature, it can be concluded that incorporating an impairment score—operationalized through current impact and past and present distress associated with an adverse event—should lead to more accurate predictions of outcomes. Additionally, the literature on methodological approaches to assessing ACEs informed the development of the additional items in the revised instrument.

In Study 2, we aimed to develop and validate the ACEs-Related Impairment Questionnaire (ACEs-RIQ), an instrument meant to be used alongside the original ACEs-Q that incorporates impact and distress items to enhance measurement accuracy and enable assessment of the predictive power of both exposure (ACEs-Q) and its effects (ACEs-RIQ). Notably, no existing instrument simultaneously assesses ACEs in terms of past and present distress and functional impact. Importantly, the ACEs-RIQ helps address some of the original instrument's shortcomings. First, the critique of the ACEs-Q's dichotomous rating format for failing to capture nuances, such as frequency of exposure, becomes less relevant, as an impairment score provides a more accurate reflection of event severity than exposure alone. Second, assessing outcome severity, which is sensitive to individual differences, might help address the lack of definitional consensus. The distinction between CM and HC is not essential in this context, as the total score measures impairment severity rather than event exposure. Finally, although the original ACEs-Q was conceptualized within a composite–formative framework, the ACEs-RIQ is aligned with a reflective model. The ACEs-RIQ is designed to measure the impairment associated with the ACEs exposure, where the direction of causality flows from the latent variable (impairment) to the indicators (past and present distress and present impact). Changes in the indicators do not alter the construct itself; rather, impact and distress items form a composite score reflecting the severity of an individual's ACEs-related impairment. The reflective model is not only easier to implement and test but also enhances the instrument's accessibility to a broader audience.

STUDY 1

Method

Participants and procedure

Participants (N = 859, M_{age} = 30.70 years, SD = 13.30, range: 18–86 years) were recruited from the general population, the online platform Prolific, and student populations, between October 2023 and December 2024. Informed consent was obtained from all participants. The sample was predominantly female (68.7%) and White (75.3%). Most participants were employed or in school full-time (64.7%), and 39.9% had attained a higher education degree. Detailed sample characteristics can be found in the Supplementary Materials (Supplementary Table S1). This study was approved by the ethics board at Nottingham Trent University.

Measures

ACEs

The ACEs-Q (Anda et al., 1999; Dong et al., 2004; Felitti et al., 1998) is a 10-item checklist-like, self-report measure used to assess adverse experiences that occurred before 18 years of age. A dichotomized response option ("yes" or "no") was used, and overall scores ranged from 0 to 10. ACEs-Q measures emotional, physical, and sexual abuse; emotional and physical neglect; and family history of mental health illness, substance use, incarceration, intimate partner violence (IPV), and parental separation.

Stress

Stress was assessed using a 10-item Perceived Stress Scale (PSS-10; Cohen et al., 1983). All items were rated on a 5-point scale ranging from 0 (*never*) to 4 (*very often*) and referred to experiences over the past month. The PSS has demonstrated good internal consistency (Cronbach's αs = .78–.91); test–retest reliability; and construct, criterion, and convergent validity in general population samples across cultures (Denovan et al., 2019; Lee, 2012; Nielsen et al., 2016; Wang et al., 2011). In the present sample, Cronbach's alpha was .86.

Depressive symptoms

To assess depressive symptoms, the Patient Health Questionnaire–9 (PHQ-9; Kroenke et al., 2001) was used. Items measured symptom frequency over the past month and were rated on a 4-point scale ranging from 0 (*not at all*) to 3 (*nearly every day*). The PHQ-9 has demonstrated excellent internal consistency (Cronbach's αs = .85–.90), interrater and test–retest reliability, and construct validity across clinical and general populations, and diverse cultural contexts (Carroll et al., 2020; Kroenke et al., 2001, 2010; Löwe et al., 2004; Martin et al., 2006; Sun et al., 2020). In the present sample, Cronbach's alpha was .90.

Anxiety

Anxiety was assessed using the 7-item Generalized Anxiety Disorder scale (GAD-7; Spitzer et al., 2006), which measures symptom frequency over the past month on a 4-point scale ranging from 0 (*not at all*) to 3 (*nearly every day*). The GAD-7 has demonstrated high internal consistency (Cronbach's αs = .83–.93), strong construct and criterion validity, and measurement invariance across gender and age in both clinical and general population samples (Johnson et al., 2019; Löwe et al., 2008; Rutter & Brown, 2017; Spitzer et al., 2006). In the present sample, Cronbach's alpha was .91.

Data analysis

R Studio (Version 4.2.1) software was used to conduct the analyses. Descriptive analyses and tetrachoric correlations were conducted to examine ACEs-Q items. Scale structure and validity were explored via PCA, and SEM was used to examine model fit and the predictive and explanatory power of ACEs-Q total and subscale (CM, HC) scores. Analysis assumptions, data distribution, skew, kurtosis, and missingness patterns were tested. Kaiser–Meyer–Olin (KMO) tests and Bartlett's test of sphericity (Bartlett, 1950) were performed to inspect the suitability of the data for factorization. KMO values of 0.8 and above (indicating a higher degree of common variance) and a significant Bartlett's test (suggesting that variables are not orthogonal) are conditions considered satisfactory for factorization.

PCA, a multivariate statistical technique used to reduce data complexity, was performed to identify components that capture maximum variance using a tetrachoric correlation matrix. To determine the optimal number of components, Horn's parallel analysis (Horn, 1965) was employed, using 95% confidence interval with 1,000 simulated iterations. The *Fa.parallel* function from the psych package (Version 2.4.3; Revelle, 2024) was used for parallel analysis. In addition, Cattell's (1966) scree test was used to visually inspect eigenvalues and identify a point of declination. These criteria, together with theoretical considerations, were jointly used to inform factor retention decisions (Costello & Osborne, 2005; Hayton et al., 2004). As outlined by Kaiser (1960), eigenvalues below 1.0 were interpreted as not representing a factor. Eigenvalues derived from the PCA provide information on the percentage of explained variance and inform

factor retention. Eigenvectors, measuring the strength of the association between indicators and components, were analyzed, with values of 0.45 and higher used as cutoff points for considering an indicator to be part of a component (Kite & Whitley, 2018). Given the assumption that ACEs-Q components would be moderately correlated, oblique (promax) rotation was applied to the data.

Structural associations were modeled using the *lavaan* package (Version 0.6-18; Rosseel et al., 2012) to compare the predictive power of composite–formative and reflective models. The comparison was informed by the strength and significance levels of the structural paths. Raw residuals were used to explore differences between implied and observed sample values and assess composite–formative model fitness. ACEs-Q total score and ACEs-Q CM and HC subscale scores represented latent variables predicting composite depression, anxiety, and stress scores. Model fit indices are not relevant for formative measurement due to model restrictions introduced for model identification purposes. Namely, the composite–formative identification requirements were met by fixing the first linear coefficient for each latent variable to 1.0 and constraining the covariance between the latent variables (CM and HC) to 0 (Bollen, 1989). Such impositions result in perfect model fit. Nevertheless, given the limitations of conventional fit index cutoffs (Bazzoli, 2025), tailored goodness-of-fit criteria for reflective models were derived using the equation-based approach proposed by Groskurth et al. (2024), which estimates expected cutoffs from regression models based on a large simulation study. Based on the study's characteristics, the resulting cutoffs for the one-factor model were a comparative fit index (CFI) greater than 1.01, a root mean square error of approximation (RMSEA) less than .02, a standardized root mean squared residual (SRMR) less than .02, and a chi-square/degrees of freedom (χ^2/df) value of approximately 1.6. For the two-factor model, the corresponding cutoffs were a CFI greater than 1.00, an RMSEA less than .01, an SRMR less than .01, and a χ^2/df value of approximately 1.5. Parameters were estimated using maximum likelihood robust estimation (MLR).

Results

Data handling and missing data

Data missingness for each participant was inspected. Eleven participants who had more than 10% of their responses missing were excluded to avoid estimation bias (Bennett, 2001). After this exclusion, there were 65 missing data points, equating to 0.4% of total data points.

Descriptive statistics, reliability, and zero-order correlations

Most participants reported experiencing at least one ACE (67.2%), with emotional abuse (39.7%) and neglect (34.2%) the most prevalent, and family imprisonment the least prevalent (5.8%). Item-level frequencies of CM and HC ACEs, along with zero-order and tetrachoric correlations showing low to high associations among the variables and items, are reported in the Supplementary Materials (Supplementary Tables S2–S5).

PCA

KMO and Bartlett's test of sphericity suggested the ACEs-Q was suitable for factorization, KMO = 0.82, $\chi^2(45, N = 859) = 1{,}333.42$, $p < .001$. Horn's parallel analysis of the total scale proposed a one-component solution as the most suitable fit for the data. Moreover, Kaiser's criteria, and the associated scree plot, indicated that a two-factor solution most accurately represented the data. A two-factor solution was retained in accordance with prior theoretical work and substantive interpretability, as data-driven procedures must be guided by theory to ensure meaningful construct representation. All eigenvectors are presented in Table 1. Factor 1 accounted for 39% of the variance, with eigenvectors ranging from 0.50 to 0.95. Factor 2 accounted for 22% of the variance, with eigenvectors ranging from 0.47 to 0.93. Factor 1 corresponded to the CM domain; Factor 2 corresponded to the HC domain, except for the item related to family mental health illness, which loaded more strongly onto the CM factor. The item "mother treated violently"

TABLE 1 Eigenvectors derived from principal component analysis with promax rotation

ACE	Eigenvector	
	Factor 1	Factor 2
Childhood maltreatment ACEs		
Emotional abuse	**0.84**	0.10
Physical abuse	**0.77**	0.03
Sexual abuse	**0.79**	−0.21
Emotional neglect	**0.95**	−0.20
Physical neglect	**0.75**	0.10
Household challenges ACEs		
Parental divorce/abandonment	−0.21	**0.93**
Mother treated violently	**0.40**	**0.47**
Family substance use	0.28	**0.52**
Family mental health illness	**0.50**	0.17
Family imprisonment	−0.05	**0.85**

Note. ACEs = adverse childhood experiences.

cross-loaded onto both factors, with a commonality value of 2.0.

SEM

The fit indices for the ACEs-Q reflective one-factor model, $\chi^2(62, N = 841) = 233.92$, $p < .001$, CFI = 0.95, TLI = 0.93, SRMR = 0.05, RMSEA = 0.06, $\chi^2/df = 3.77$, and ACEs-Q reflective two-factor model, $\chi^2(58, N = 841) = 178.43$, $p < .001$, CFI = 0.96, TLI = 0.95, SRMR = 0.04, RMSEA = 0.05, $\chi^2/df = 3.08$, did not indicate good model fit. For the composite–formative models, raw residuals indicated an acceptable fit, ranging from -0.12 to 0.09, with most residual values being 0 across the models. Figure 1 presents path coefficients for the one-factor model (ACEs-Q as a single latent variable) and two-factor model (separate CM and HC latent variables) across internalizing outcomes, shown for both the reflective and composite–formative approaches. The one-factor models predicted the outcomes positively and significantly. The two-factor models showed significant positive associations between the CM factor and all outcomes, whereas the HC factor negatively predicted the outcomes only in the composite–formative model.

Discussion

The aim of Study 1 was to inspect the structure and predictive validity of the 10-item second revision ACEs-Q across reflective and composite–formative approaches. In line with previous findings on similar versions of the instrument, albeit based on reflective measurement, PCA largely supported a two-factor solution distinguishing CM and HC (Choi et al., 2020; Gette et al., 2022; Karatekin & Hill, 2019; Mersky et al., 2017). Although the ACEs-Q "family mental health illness" item loaded more strongly onto the CM factor, it was kept under HC due to its conceptual suitability within the domain established in previous studies. Mental health illness in the family might impair caregivers' ability to support their child, possibly resulting in neglect and/or abuse (Mulder et al., 2018), which falls under the maltreatment (i.e., CM) domain. Similarly, the "mother treated violently" item loaded onto both factors, which can be explained by high co-occurrence of intimate partner violence (IPV) and child maltreatment (Sijtsema et al., 2020). As ACEs-Q items reflect interrelated experiences that frequently co-occur, some cross-loadings were anticipated. Although future models could explicitly model such cross-loadings, these patterns may be sample-specific, given the known socioeconomic variability in ACE exposure (Karatekin & Hill, 2019). Guided by the principle that data-driven analyses must be theory-informed (MacCallum et al., 1992), item allocation to CM and HC was, therefore, based on conceptual considerations.

SEM was used to evaluate and compare composite–formative and reflective approaches. Although conventional cutoffs for dichotomous indicators in samples of 250 participants or more were met (i.e., CFI and Tucker–Lewis index values of .95 or higher, RMSEA of .05 or lower; Yu, 2002), the tailored cutoffs indicated that the reflective models showed somewhat suboptimal fit, meaning the structural effects should be interpreted with caution. Both one-factor models significantly predicted internalizing outcomes. The composite–formative two-factor approach found CM to positively predict internalizing outcomes, with moderate effect sizes, and HC to negatively predict the outcomes, with small effect sizes. The reflective two-factor model indicated significant positive associations between the outcomes and the CM factor but not the HC factor. These discrepancies can be attributed to the differences in modeling approaches, implicating issues related to construct definition. Interestingly, in composite–formative specification, effect sizes were mostly larger in the combined model than the two-factor model despite the negative association between HC and outcomes in the latter. It is possible that by treating two latent variables with opposing associations with the outcome as one, the combined measurement can capture a broader range of variance in the outcome, resulting in larger effect size.

To enhance predictive validity, it is essential to theoretically conceptualize and specify the appropriate measurement approach. From a theoretical standpoint, the ACEs-Q is best conceptualized as a composite–formative model; however, formative models are associated with measurement limitations. One key issue is that formative constructs cannot be identified independently of an endogenous outcome variable, which raises concerns about construct stability and increases the risk of interpretational confounding (Howell et al., 2007). This is particularly problematic given that internal consistency is not applicable, and external consistency is model-dependent. This issue is closely tied to a lack of definitional consensus, which has significant theoretical, analytical, and practical implications. Despite the limitations of formative measurement, imposing a reflective approach on what is theoretically a formative construct is not a viable solution, as it introduces further issues, such as Type I and Type II errors (MacKenzie et al., 2005). Although this was done in the present study for comparative purposes, formative models should not be used interchangeably with reflective models, nor should the same analytical approaches be assumed to be applicable. Composite–formative models are weighted sums of indicators, with no residual variance; the indicators function as predictors of the construct rather than measures of it, meaning that more than predictive validity should not be expected from these models. To improve predictive accuracy, weighted approaches for ACEs measures have been proposed to account for differ-

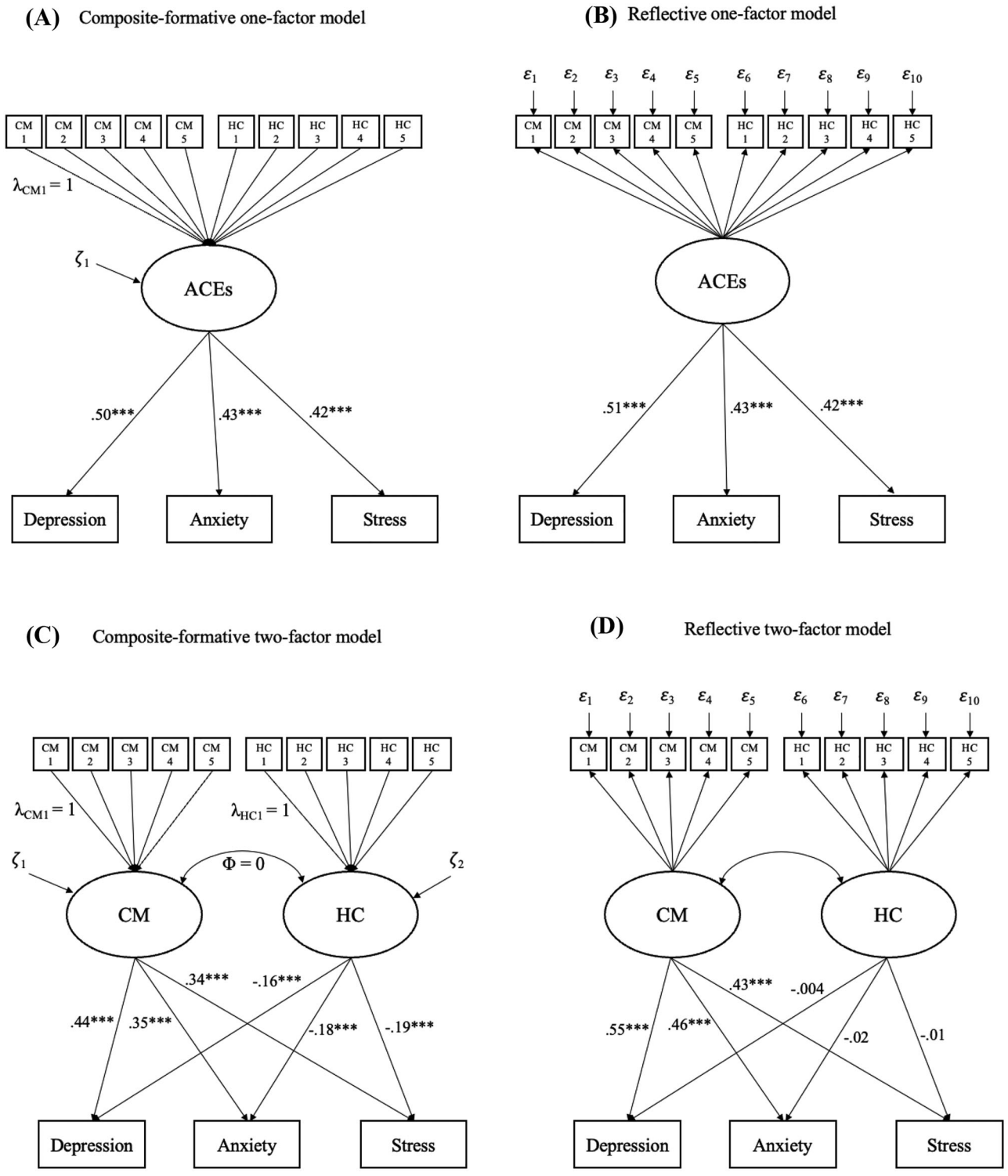

FIGURE 1 *Path diagrams presenting one- and two-factor models across modeling approaches*

Note: The figure presents path diagrams for the (A) composite–formative one-factor model, (B) reflective one-factor model, (C) composite–formative two-factor model, and (D) reflective two-factor model. Zeta (ζ) represents the structural error term of a latent endogenous variable. Epsilon (ε) represents the measurement error term of observed indicators. Lambda (λ) represents the factor loading between an indicator and a latent variable. Phi (ϕ) represents the covariance between two exogenous latent variables. ACEs-Q = Adverse Childhood Experiences Questionnaire; CM = Childhood Maltreatment factor; HC = Household Challenges factor.

*$p < .05$. **$p < .01$. *** $p < .001$.

ences in the contributions of individual indicators to the construct (Schilling et al., 2008), an approach fundamentally aligned with composite–formative modeling.

Our findings on the ACES-Q's structure and predictive validity reinforce concerns about how adversity is defined and which experiences are included in ACEs assessments, particularly within the HC domain. The HC subscale may require further revisions to ensure the included experiences are relevant to the construct and outcomes. Recent developments in ACEs research increasingly incorporate broader social and environmental adversities, such as poverty and bullying, to improve identification and avoid underestimation when using cumulative scoring (Mersky et al., 2017). Adopting a weighted approach, such as a formative model, may enhance predictive precision, at least until a universally accepted definition is established. Given the significant role of ACEs research in shaping policy and practice, improving the accuracy of assessments is essential for informing public health strategies.

STUDY 2

Method

Participants and procedure

Participants ($N = 297$, $M_{age} = 30.12$ years, $SD = 13.83$, range: 18–76 years) were recruited from general and student populations between October and December 2024. Informed consent was obtained from all participants. Participants were predominantly female (70.7%), White (75.3%), and employed or in school full-time (64.7%), with 39.9% having attained a higher education degree. Detailed sample characteristics are presented in the Supplementary Materials (Supplementary Table S6). This study was approved by the Ethics Board of Nottingham Trent University.

Measures

Descriptions of the ACEs-Q, PSS, PHQ-9, and GAD-7 are provided in the Measures subsection under Study 1. In the Study 2 sample, the internal reliability was good for the PSS, Cronbach's $\alpha = .88$; PHQ-9, Cronbach's $\alpha = .87$; and GAD-7, Cronbach's $\alpha = .91$.

ACEs-related impairment

The ACEs-Q was expanded to include distress and impact items. When an ACEs-Q item was endorsed, participants were asked to rate their distress at the time of the event ("How distressing was this experience for you at the time?"), current event-related distress ("How distressing is this experience for you in the present?"), and current event-related impact ("How much does this experience impact you in the present?"). For event-related impact, participants were instructed to refer to the degree to which the experience affected their personal, professional, and social lives.

The three-item scale has an ordinal response format, with each question rated on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). ACEs-RIQ items were summed to yield past distress, current distress, and current impact scores, which were used in subsequent analyses. Importantly, this instrument allows flexible application regarding the subscales included and the scoring methods employed. In this sample, the ACEs-RIQ demonstrated excellent internal consistency, Cronbach's $\alpha = .92$.

Data analysis

Analyses were conducted using R Studio (Version 4.2.1). Assumptions, data distribution, skew, and kurtosis were checked. Pearson's correlation analyses were conducted to inspect associations between the ACEs-RIQ and internalizing outcomes. The *lavaan* package (Version 0.6-18; Rosseel et al., 2012) was used for SEM analyses. Two latent models were specified. The *exposure model* used the ACEs-Q, represented by 10 indicators, as the latent predictor variable, whereas the *impairment model* used the ACEs-RIQ, represented by three indicators. Both models included depressive, anxiety, and stress symptoms as latent outcomes, with age and sex specified as control variables. The measurement portion of the impairment model was tested using CFA. Tailored goodness-of-fit criteria for the impairment model were derived using the equation-based approach proposed by Groskurth et al. (2024), consistent with Study 1. Based on the characteristics of the present study, the resulting cutoff values were a CFI greater than .90, RMSEA less than .07, SRMR less than .04, and χ^2/df of approximately 2.3. As the ACEs in the exposure model were specified using a composite–formative approach, model fit calculations were not relevant and, therefore, not reported. Structural associations for the models were specified and tested. The exposure model was specified by fixing the first linear coefficient of the latent variable to 1.0 for model identification purposes (see Study 1). Parameters were estimated using MLR.

Results

Data handling and missing data

Eight participants with more than 10% missing responses were excluded to minimize estimation bias (Bennett, 2001). Following their exclusion, 30 data points remained missing, accounting for 0.3% of the total data.

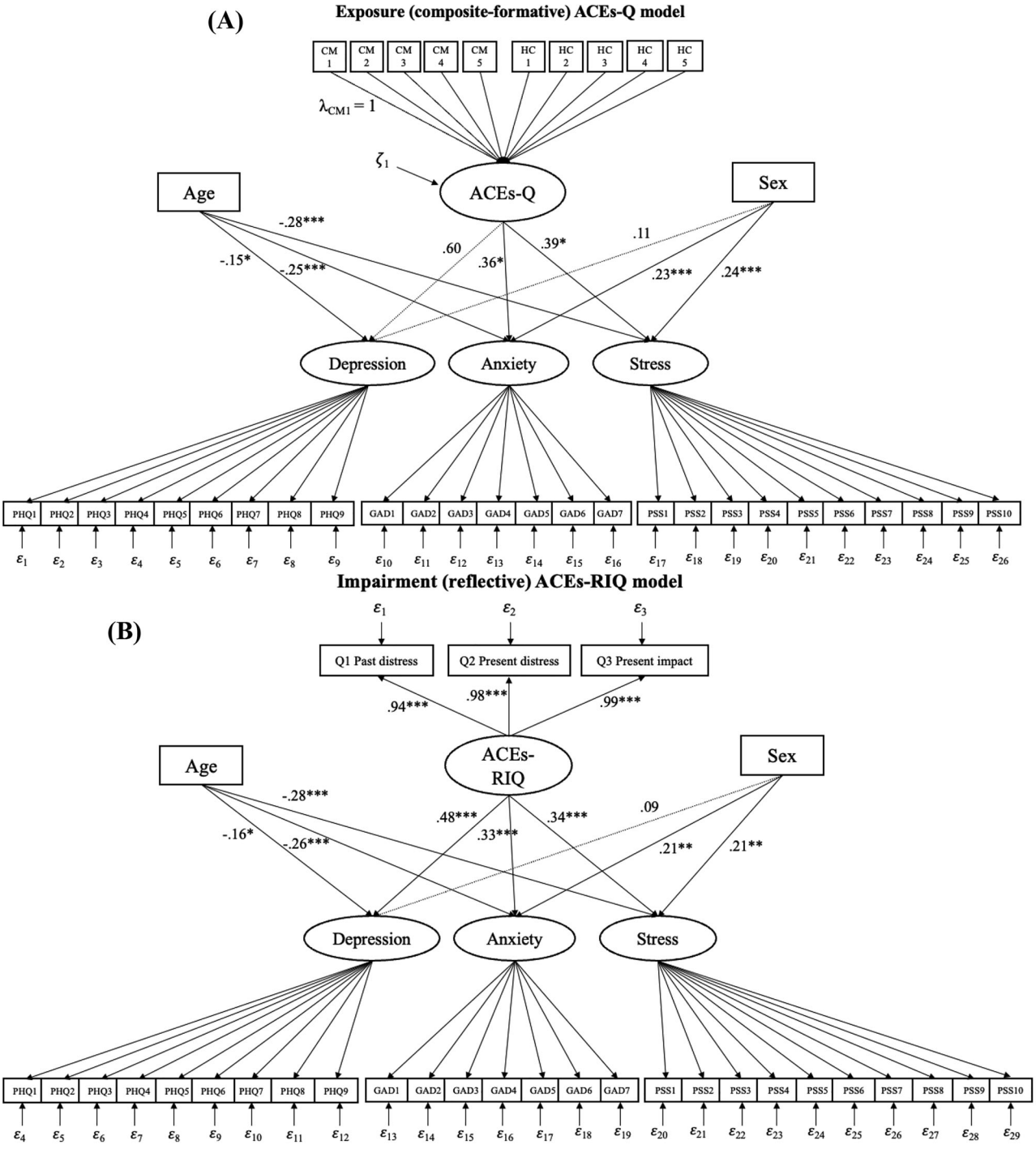

FIGURE 2 Path diagrams for the (A) exposure and (B) impairment models

Note. Zeta (ζ) represents the structural error term of a latent endogenous variable. Epsilon (ε) represents the measurement error term of observed indicators. Lambda (λ) represents the factor loading between an indicator and a latent variable. ACEs-Q = Adverse Childhood Experiences Questionnaire, ACEs-RIQ = ACEs-Related Impairment Questionnaire.

*$p < .05$. **$p < .01$. *** $p < .001$.

Descriptive statistics and zero-order correlations

The most reported ACEs were emotional abuse (33.4%) and neglect emotional (32.3%), whereas the least commonly experienced ACE was family imprisonment (6.1%), mirroring the Study 1 pattern. Most participants reported experiencing at least one ACE (70.7%). Item frequencies, descriptive statistics, Cronbach's alpha values, and zero-order correlations for the study variables are presented in the Supplementary Materials (Supplementary Tables S7–S8). Correlations between the ACEs-RIQ and internalizing measures were moderate, whereas correlations among the internalizing measures were high.

SEM

Measurement model

The impairment model showed generally adequate fit except for the SRMR, $\chi^2(371, N = 297) = 842.47$, $p < .001$, CFI = .90, TLI = .89, SRMR = .06, RMSEA = .07, $\chi^2/df = 2.27$. Standardized loadings of indicators on the latent variables were positive, significant, and moderate-to-high in size (0.48–0.98), with ACEs-RIQ loadings ranging from .94 to .98.

Structural model

Structural associations were comparable across the models, with effect sizes in the impairment model exhibiting higher significance thresholds. Both predictors showed the strongest association with depressive symptoms, followed by stress and anxiety symptoms. Models are presented in Figure 2 and the Supplementary Materials (Supplementary Table S9).

Discussion

Whereas Study 1 indicated limitations with ACEs-Q measurement and properties, Study 2 aimed to improve its predictive accuracy by developing a revised version informed by Study 1 findings and considerations from the wider trauma literature. Informed by this information, the ACEs-RIQ was developed to assess impairment associated with ACEs, operationalized through past and current distress and psychosocial impact. Study 2 aimed to evaluate the internal consistency and predictive validity of the ACEs-RIQ (impairment through exposure) and the original ACEs-Q (exposure alone) via SEM. The ACEs-RIQ demonstrated excellent internal consistency. Both the exposure model (ACEs-Q) and the impairment model (ACEs-RIQ) indicated significant positive associations with anxiety and stress, with the impairment model alone predicting depression.

These comparable results may seem surprising, as the total impairment score was expected to capture broader variance by accounting for a wider range of factors contributing to the outcome compared to exposure alone. However, capturing more variance does not necessarily lead to larger effect sizes. Although effect sizes were similar across the models, and both models employed weighted approaches to enable direct comparison, the structural paths in the exposure model were significant only at higher thresholds. This should be interpreted with caution due to the commonly reported Type I error associated with the .05 *p*-value threshold (Ioannidis, 2005). Hence, the ACEs-Q model is likely less precise in outcome measurement, as it accounts for a smaller range of variance and exhibits significance at higher thresholds, potentially leading to an overestimation or underestimation of outcomes. Although model specification should not, in theory, affect significance values, the structural impositions in the exposure model marginally constrained the effect sizes.

As with most trauma measures, the limitations of the ACEs-RIQ relate primarily to its retrospective, self-report design (Tourangeau & Yan, 2007). Distress and impact items may pose concerns regarding memory accuracy and recall bias and may be influenced by the respondent's present emotional state (Thomas & Diener, 1990), representing a central limitation affecting interpretability. Nevertheless, the ACEs-RIQ offers flexibility in item inclusion, enabling temporal separation and isolated analysis of items.

Taken together, the results provide evidence of the ACEs-RIQ's predictive and convergent validity alongside excellent reliability. When used in addition to the ACEs-Q, the ACEs-RIQ can help address several limitations of the original measure. Specifically, by assessing impairment on an ordinal scale, the ACEs-RIQ offers a more nuanced evaluation of ACEs severity in contrast to the binary rating system and cumulative scoring approach typical of the ACEs-Q. These traditional methods fail to account for differences in experience severity across items, as each is treated equivalently in statistical analyses. Measuring impairment also mitigates concerns regarding the ACEs-Q's scale structure and construct definition, as the ACEs-RIQ is sensitive to individual variation in the impact of adversity. Furthermore, the ACEs-RIQ is conceptualized as a reflective measure, which broadens the range of applicable statistical techniques and facilitates implementation compared to formative models. Specifically, the ACEs-RIQ does not require weighted approaches to estimate the contribution of individual items, thereby reducing both analytical complexity and sample size

requirements. Designed as a concise, user-friendly tool, the ACEs-RIQ is the first instrument of its kind to facilitate nuanced assessment of adversity-related outcomes across settings.

GENERAL DISCUSSION

Given the lack of empirical support for the ACEs-Q, Study 1 evaluated the measure's structure and predictive validity to inform future psychometric applications. First, the findings showed that the CM and HC factors should be treated separately due to their conceptual distinctiveness and differing predictive outcomes. Second, although ACEs are poorly defined, they are most accurately conceptualized as a composite–formative model and captured using weighted approaches. Third, impairment associated with ACE exposure may be more informative in outcome measurement, offering a more nuanced understanding of the interactions between variables in the ACEs aftermath. To address this, the ACEs-RIQ, a validated supplementary instrument, was developed to measure ACEs-related impairment. Although effect sizes were similar for the ACEs-Q and ACEs-RIQ, the latter offers greater confidence by capturing broader variance.

This paper provides two distinct yet complementary options for future ACEs assessment. For exposure, the revised modeling of the ACEs-Q offers a theoretically grounded and more accurate alternative to traditional reflective approaches, albeit with more analytical complexity. For impairment, the ACEs-RIQ provides a conceptually coherent and less complex yet valid and reliable option. Taken together, these two approaches enhance measurement precision and offer flexible tools for both research and applied fields.

The findings of these studies should be considered in the context of limitations associated with retrospective assessments of ACEs and trauma in general. Despite good test–retest reliability scores reported in studies that utilized similar assessments (Karatekin & Hill, 2019; Mersky et al., 2017), instruments assessing sensitive topics, such as those included on the ACEs-Q, are prone to self-report bias and retrospective recall errors (Tourangeau & Yan, 2007). Furthermore, both the Study 1 and Study 2 samples demonstrated characteristics suggesting a relatively high socioeconomic status, so the findings may be less applicable to other socioeconomic groups. Compared with other studies assessing a broader range of the general population (e.g., Dong et al., 2004), lower rates of physical neglect and IPV and higher rates of emotional abuse and neglect were recorded. Studies in low-income female samples have demonstrated a higher prevalence of all ACEs except emotional abuse and neglect, suggesting that sociodemographic factors may affect the prevalence of individual ACE exposure (Karatekin & Hill, 2019; Mersky et al., 2017).

This two-study manuscript addresses important conceptual, theoretical, and measurement issues surrounding the scale structure and predictive validity of the ACEs-Q. It offers critical guidance for the questionnaire's future psychometric use as a composite–formative model, while considering limitations related to the instrument and modeling approach. A supplementary measure, the ACEs-RIQ, was developed to address key shortcomings of the ACEs-Q, related to rating format, scoring, factor structure, and construct definition. The ACEs-RIQ is simple to use, enhancing its accessibility to a wider audience. When used alongside the ACEs-Q, it enables a more nuanced assessment of adversity severity, with relevance to both research and applied contexts.

AUTHOR NOTE

The Bial Foundation provided funding for this study (092/2022).

We wish to thank Abigail Watkins, Katie Phelps, and Siavash Rakhtshah for their assistance as research assistants on the project. We also thank participants for taking the time to complete the survey.

OPEN PRACTICES STATEMENT

The Data and code used in this research are publicly available on the Open Science Framework repository at https://osf.io/xbrmy/?view_only=bc4d2b4113d64e3b90242b2b666af845.

AUTHOR CONTRIBUTIONS

Borna Loncar: conceptualization, investigation, writing–original draft, writing–review and editing, visualization, validation, methodology, formal analysis, software, project administration, data curation, resources. **Robert Fox**: writing–review and editing, supervision. **Nadja Heym**: funding acquisition, supervision, writing–review and editing, resources. **Alexander Sumich**: funding acquisition, supervision, writing–review and editing, resources.

ORCID

Borna Loncar https://orcid.org/0009-0006-0863-4560
Robert Fox https://orcid.org/0000-0002-0950-3865
Nadja Heym https://orcid.org/0000-0003-2414-8854
Alexander Sumich https://orcid.org/0000-0003-4333-8442

REFERENCES

Anda, R. F., Croft, J. B., Felitti, V. J., Nordenberg, D., Giles, W. H., Williamson, D. F., & Giovino, G. A. (1999). Adverse childhood experiences and smoking during adolescence and adulthood. *JAMA*, *282*(17), 1652–1658. https://doi.org/10.1001/jama.282.17.1652

Bartlett, M. S. (1950). Tests of significance in factor analysis. *British Journal of Psychology*, *3*, 77–85.

Bazzoli, A. (2025). Magic number .95? Or was it .08? A refresher on SEM approximate fit indices thresholds for applied psychologists and management scholars. *Group & Organization Management*, *50*(4), 1136–1144. https://doi.org/10.1177/10596011241258314

Bennett, D. A. (2001). How can I deal with missing data in my study? *Australian and New Zealand Journal of Public Health*, *25*(5), 464–469. https://doi.org/10.1111/j.1467-842X.2001.tb00294.x

Bethell, C. D., Carle, A., Hudziak, J., Gombojav, N., Powers, K., Wade, R., & Braveman, P. (2017). Methods to assess adverse childhood experiences of children and families: Toward approaches to promote child well-being in policy and practice. *Academic Pediatrics*, *17*(7), S51–S69. https://doi.org/10.1016/j.acap.2017.04.161

Bollen, K. A. (1989). *Structural equations with latent variables*. John Wiley & Sons.

Brown, M. J., Thacker, L. R., & Cohen, S. A. (2013). Association between adverse childhood experiences and diagnosis of cancer. *PloS One*, *8*(6), Article e65524. https://doi.org/10.1371/journal.pone.0065524

Brumley, L. D., Brumley, B. P., & Jaffee, S. R. (2019). Comparing cumulative index and factor analytic approaches to measuring maltreatment in the National Longitudinal Study of Adolescent to Adult Health. *Child Abuse & Neglect*, *87*, 65–76. https://doi.org/10.1016/j.chiabu.2018.08.014

Carroll, H. A., Hook, K., Perez, O. F. R., Denckla, C., Vince, C. C., Ghebrehiwet, S., Ando, K., Touma, M., Borba, C. P. C., Fricchione, G. L., & Henderson, D. C. (2020). Establishing reliability and validity for mental health screening instruments in resource-constrained settings: Systematic review of the PHQ-9 and key recommendations. *Psychiatry Research*, *291*, Article 113236. https://doi.org/10.1016/j.psychres.2020.113236

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, *1*(2), 245–276. https://doi.org/10.1207/s15327906mbr0102_10

Choi, C., Mersky, J. P., Janczewski, C. E., Plummer Lee, C.-T., Davies, W. H., & Lang, A. C. (2020). Validity of an expanded assessment of adverse childhood experiences: A replication study. *Children and Youth Services Review*, *117*, Article 105216. https://doi.org/10.1016/j.childyouth.2020.105216

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*(4), 385–396. https://doi.org/10.2307/2136404

Costello, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research, and Evaluation*, *10*(1), Article 7. https://doi.org/10.7275/jyj1-4868

Dong, M., Anda, R. F., Felitti, V. J., Dube, S. R., Williamson, D. F., Thompson, T. J., Loo, C. M., & Giles, W. H. (2004). The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse & Neglect*, *28*(7), 771–784. https://doi.org/10.1016/j.chiabu.2004.01.008

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, *14*(4), 245–258. https://doi.org/10.1016/S0749-3797(98)00017-8

Frans, Ö., Rimmö, P.-A., Åberg, L., & Fredrikson, M. (2005). Trauma exposure and post-traumatic stress disorder in the general population. *Acta Psychiatrica Scandinavica*, *111*(4), 291–290. https://doi.org/10.1111/j.1600-0447.2004.00463.x

Gette, J. A., Gissandaner, T. D., Littlefield, A. K., Simmons, C. S., & Schmidt, A. T. (2022). Modeling the Adverse Childhood Experiences Questionnaire–International Version. *Child Maltreatment*, *27*(4), 527–538. https://doi.org/10.1177/10775595211043122

Gilbert, L. K., Breiding, M. J., Merrick, M. T., Thompson, W. W., Ford, D. C., Dhingra, S. S., & Parks, S. E. (2015). Childhood adversity and adult chronic disease: An update from ten states and the District of Columbia, 2010. *American Journal of Preventive Medicine*, *48*(3), 345–349. https://doi.org/10.1016/j.amepre.2014.09.006

Groskurth, K., Bluemke, M., & Lechner, C. M. (2024). Why we need to abandon fixed cutoffs for goodness-of-fit indices: An extensive simulation and possible solutions. *Behavior Research Methods*, *56*(4), 3891–3914. https://doi.org/10.3758/s13428-023-02193-3

Hashoul-Andary, R., Assayag-Nitzan, Y., Yuval, K., Aderka, I. M., Litz, B., & Bernstein, A. (2016). A longitudinal study of emotional distress intolerance and psychopathology following exposure to a potentially traumatic event in a community sample. *Cognitive Therapy and Research*, *40*(1), 1–13. https://doi.org/10.1007/s10608-015-9730-4

Hayton, J. C., Allen, D. G., & Scarpello, V. (2004). Factor retention decisions in exploratory factor analysis: A tutorial on parallel analysis. *Organizational Research Methods*, *7*(2), 191–205. https://doi.org/10.1177/1094428104263675

Holden, G. W., Gower, T., & Chmielewski, M. (2020). Methodological considerations in ACEs research. In G. J. G. Asmundson & T. O. Afifi (Eds), *Adverse childhood experiences* (pp. 161–182). Academic Press. https://doi.org/10.1016/B978-0-12-816065-7.00009-4

Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika*, *30*(2), 179–185. https://doi.org/10.1007/BF02289447

Howell, R. D., Breivik, E., & Wilcox, J. B. (2007). Is formative measurement really measurement? Reply to Bollen (2007) and Bagozzi (2007). *Psychological Methods*, *12*(2), 238–245. https://doi.org/10.1037/1082-989X.12.2.238

Ioannidis, J. P. A. (2005). Why most published research findings are false. *PLoS Medicine*, *2*(8), Article e124. https://doi.org/10.1371/journal.pmed.0020124

Johnson, S. U., Ulvenes, P. G., Øktedalen, T., & Hoffart, A. (2019). Psychometric 0roperties of the General Anxiety Disorder 7-Item (GAD-7) Scale in a heterogeneous psychiatric sample. *Frontiers in Psychology*, *10*, Article 1713. https://doi.org/10.3389/fpsyg.2019.01713

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement*, *20*, 141–151. https://doi.org/10.1177/001316446002000116

Karatekin, C., & Hill, M. (2019). Expanding the original definition of adverse childhood experiences (ACEs). *Journal of Child & Adolescent Trauma*, *12*(3), 289–306. https://doi.org/10.1007/s40653-018-0237-5

Kidman, R., Smith, D., Piccolo, L. R., & Kohler, H.-P. (2019). Psychometric evaluation of the Adverse Childhood Experience Inter-

national Questionnaire (ACE-IQ) in Malawian adolescents. *Child Abuse & Neglect*, *92*, 139–145. https://doi.org/10.1016/j.chiabu.2019.03.015

Kite, M. E., & Whitley, B. E. (2018). Factor analysis, path analysis, and structural equation modeling. In *Principles of research in behavioral science* (4th ed., pp. 466–495). Routledge.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Kroenke, K., Spitzer, R. L., Williams, J. B. W., & Löwe, B. (2010). The Patient Health Questionnaire Somatic, Anxiety, and Depressive Symptom Scales: A systematic review. *General Hospital Psychiatry*, *32*(4), 345–359. https://doi.org/10.1016/j.genhosppsych.2010.03.006

Lee, E.-H. (2012). Review of the psychometric evidence of the Perceived Stress Scale. *Asian Nursing Research*, *6*(4), 121–127. https://doi.org/10.1016/j.anr.2012.08.004

Litrownik, A. J., Lau, A., English, D. J., Briggs, E., Newton, R. R., Romney, S., & Dubowitz, H. (2005). Measuring the severity of child maltreatment. *Child Abuse & Neglect*, *29*(5), 553–573. https://doi.org/10.1016/j.chiabu.2003.08.010

Löwe, B., Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W., & Herzberg, P. Y. (2008). Validation and standardization of the Generalized Anxiety Disorder screener (GAD-7) in the general population. *Medical Care*, *46*(3), 266–274. https://doi.org/10.1097/MLR.0b013e318160d093

Löwe, B., Spitzer, R. L., Gräfe, K., Kroenke, K., Quenter, A., Zipfel, S., Buchholz, C., Witte, S., & Herzog, W. (2004). Comparative validity of three screening questionnaires for *DSM-IV* depressive disorders and physicians' diagnoses. *Journal of Affective Disorders*, *78*(2), 131–140. https://doi.org/10.1016/S0165-0327(02)00237-9

MacCallum, R. C., Roznowski, M., & Necowitz, L. B. (1992). Model modifications in covariance structure analysis: The problem of capitalization on chance. *Psychological Bulletin*, *111*(3), 490–504. https://doi.org/10.1037/0033-2909.111.3.490

MacKenzie, S. B., Podsakoff, P. M., & Jarvis, C. B. (2005). The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions. *Journal of Applied Psychology*, *90*(4), 710–730. https://doi.org/10.1037/0021-9010.90.4.710

Martin, A., Rief, W., Klaiberg, A., & Braehler, E. (2006). Validity of the Brief Patient Health Questionnaire Mood Scale (PHQ-9) in the general population. *General Hospital Psychiatry*, *28*(1), 71–77. https://doi.org/10.1016/j.genhosppsych.2005.07.003

Matthews, G. (2016). Distress. In G. Fink (Ed.), *Stress: concepts, cognition, emotion, and behavior* (pp. 219–226). Academic Press. https://doi.org/10.1016/B978-0-12-800951-2.00026-1

McLaughlin, K. A. (2016). Future directions in childhood adversity and youth psychopathology. *Journal of Clinical Child and Adolescent Psychology*, *45*(3), 361–382. https://doi.org/10.1080/15374416.2015.1110823

McLennan, J. D., MacMillan, H. L., & Afifi, T. O. (2020). Questioning the use of adverse childhood experiences (ACEs) questionnaires. *Child Abuse & Neglect*, *101*, Article 104331. https://doi.org/10.1016/j.chiabu.2019.104331

Meinck, F., Cosma, A. P., Mikton, C., & Baban, A. (2017). Psychometric properties of the Adverse Childhood Experiences–Abuse Short Form (ACE-ASF) among Romanian high school students. *Child Abuse & Neglect*, *72*, 326–337. https://doi.org/10.1016/j.chiabu.2017.08.016

Mersky, J. P., Janczewski, C. E., & Topitzes, J. (2017). Rethinking the measurement of adversity: Moving toward second-generation research on adverse childhood experiences. *Child Maltreatment*, *22*(1), 58–68. https://doi.org/10.1177/1077559516679513

Mulder, T. M., Kuiper, K. C., van der Put, C. E., Stams, G.-J. J. M., & Assink, M. (2018). Risk factors for child neglect: A meta-analytic review. *Child Abuse & Neglect*, *77*, 198–210. https://doi.org/10.1016/j.chiabu.2018.01.006

Nielsen, M. G., Ørnbøl, E., Vestergaard, M., Bech, P., Larsen, F. B., Lasgaard, M., & Christensen, K. S. (2016). The construct validity of the Perceived Stress Scale. *Journal of Psychosomatic Research*, *84*, 22–30. https://doi.org/10.1016/j.jpsychores.2016.03.009

Pat-Horenczyk, R., Cohen, S., Ziv, Y., Achituv, M., Brickman, S., Blanchard, T., & Brom, D. (2017). Stability and change in post-traumatic distress: A 7-year follow-up study of mothers and young children exposed to cumulative trauma. *Journal of Traumatic Stress*, *30*(2), 115–124. https://doi.org/10.1002/jts.22177

Perkonigg, A., Kessler, R. C., Storz, S., & Wittchen, H.-U. (2000). Traumatic events and post-traumatic stress disorder in the community: Prevalence, risk factors and comorbidity. *Acta Psychiatrica Scandinavica*, *101*(1), 46–59. https://doi.org/10.1034/j.1600-0447.2000.101001046.x

Reidy, D. E., Niolon, P. H., Estefan, L. F., Kearns, M. C., D'Inverno, A. S., Marker, C. D., & Merrick, M. T. (2021). Measurement of adverse childhood experiences: It matters. *American Journal of Preventive Medicine*, *61*(6), 821–830. https://doi.org/10.1016/j.amepre.2021.05.043

Revelle, W. (2024). *An introduction to the psych package: Part II Scale construction and psychometrics*. https://cran.r-project.org/web/packages/psychTools/vignettes/overview.pdf

Rosseel, Y., Jorgensen, T. D., & De Wilde, L. (2012). *lavaan: Latent variable analysis* (p. 0.6–19) [Data set]. https://doi.org/10.32614/CRAN.package.lavaan

Rutter, L. A., & Brown, T. A. (2017). Psychometric properties of the Generalized Anxiety Disorder Scale-7 (GAD-7) in outpatients with anxiety and mood disorders. *Journal of Psychopathology and Behavioral Assessment*, *39*(1), 140–146. https://doi.org/10.1007/s10862-016-9571-9

Schilling, E. A., Aseltine, R. H., & Gore, S. (2008). The impact of cumulative childhood adversity on young adult mental health: Measures, models, and interpretations. *Social Science & Medicine*, *66*(5), 1140–1151. https://doi.org/10.1016/j.socscimed.2007.11.023

Scott, B. G., Burke, N. J., Weems, C. F., Hellman, J. L., & Carrión, V. G. (2013). The Interrelation of adverse childhood experiences within an at-risk pediatric sample. *Journal of Child & Adolescent Trauma*, *6*(3), 217–229. https://doi.org/10.1080/19361521.2013.811459

Sijtsema, J. J., Stolz, E. A., & Bogaerts, S. (2020). Unique risk factors of the co-occurrence between child maltreatment and intimate partner violence perpetration. *European Psychologist*, *25*(2), 122–133. https://doi.org/10.1027/1016-9040/a000396

SmithBattle, L., Rariden, C., Cibulka, N., & Loman, D. G. (2022). Adverse childhood experiences as public health threat. *American Journal of Nursing*, *122*(3), Article 11. https://doi.org/10.1097/01.NAJ.0000822924.33625.c7

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The

GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Sun, Y., Fu, Z., Bo, Q., Mao, Z., Ma, X., & Wang, C. (2020). The reliability and validity of PHQ-9 in patients with major depressive disorder in psychiatric hospital. *BMC Psychiatry*, *20*(1), Article 474. https://doi.org/10.1186/s12888-020-02885-6

Thomas, D. L., & Diener, E. (1990). Memory accuracy in the recall of emotions. *Journal of Personality and Social Psychology*, *59*(2), 291–297. https://doi.org/10.1037/0022-3514.59.2.291

Tourangeau, R., & Yan, T. (2007). Sensitive questions in surveys. *Psychological Bulletin*, *133*(5), 859–883. https://doi.org/10.1037/0033-2909.133.5.859

Yu, C.-Y. (2002). *Evaluating cutoff criteria of model fit indices for latent variable models with binary and continuous outcomes* [Doctoral dissertation]. University of California, Los Angeles.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Loncar, B., Fox, R., Heym, N., & Sumich, A. (2026). Psychometric considerations of Adverse Childhood Experiences Questionnaire: Structure, validity, and the development of a supplementary instrument. *Journal of Traumatic Stress*, 1–14. https://doi.org/10.1002/jts.70062